THE GAS JOURNAL

AUGUST 31, 1932

Vol. 199 84th Year No. 3615

A Glance at the Contents—

High-Pressure Gas Lighting.

An excellent photograph in our News Columns shows the splendid effect of the high-pressure gas lighting in front of the City Hall, Belfast. [p. 445.]

Gas Oils for Carburetting.

Mr. A. Holmes, of the Standard Oil Company of New Jersey, describes a new method for the evaluation of the carburetting values of gas oils. [p. 459.]

Verticals for Small Undertakings.

The application of the continuous vertical retort to the requirements of the small gas undertaking is the subject of a paper read before the Irish Association of Gas Managers, at their Annual Meeting at Dublin on August 16, by Mr. F. G. M'Elwee, of Coleraine. [p. 456.]

Gas Sales in 1931.

Expressed by a figure of percentage, the increase in the quantity of gas sold in 1931, as compared with 1930, by the authorized gas undertakings in Great Britain, may not be very substantial, but in actual amount it is quite considerable. Published a few days ago, the Board of Trade official Return tells us that the quantity of gas made (including gas bought from coke ovens) by the 749 undertakings included in 1931 was 707 million c.ft. (0·2 p.ct.) more than the amount for 1930, while the quantity sold increased by 702 million c.ft., or 0·2 p.ct. [p. 445.]

Floodlighting by Gas.

A good example of floodlighting by gas is afforded by a photograph which we reproduce of the local park lighted by the Bilston Gas Company during a floral fête. [p. 447.]

An Interesting Purification System.

The oxide purification system in use at Nanterre is described in our " Continental Notes " columns. The Klönne system in use at Recklinghausen was adopted, since it enables ground space and labour costs to be much reduced. [p. 455.]

Gas Oil for Benzole Recovery.

This was the subject of a paper read before the Midland Section of the Coke Oven Managers' Association by F. White and S. Kellett, B.Sc., in which the authors deal with the behaviour of absorbent oils and the properties of creosote and gas oil, showing the effect of thickening and sludging during use for benzole recovery. [p. 460.]

Continuous Vertical Retorts at Warsaw.

Mr. J. Malecki contributes an account of the congress of Polish Gas and Water Engineers held in Wilno last June. One of the most interesting of the papers submitted was a heat balance of the carbonizing plant at Warsaw on the Glover-West system, which was described in the " JOURNAL " last year. This paper was prepared by Mr. Malecki. [p. 451.]

Forthcoming Engagements

Sept. 1.—ASSOCIATION OF STATUTORY METER INSPECTORS.—Annual Meeting in Edinburgh.

Sept. 5-8.—ASSOCIATION OF PUBLIC LIGHTING ENGINEERS.—Annual Conference in Blackpool.

Sept. 8.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual Meeting in Ayr.

Sept. 13.—INSTITUTION OF GAS ENGINEERS.—Meetings of Finance Sub-Committee, 10 a.m.; Finance Committee, 10.30 a.m.; Executive Committee, 11 a.m.; Gas Education Executive Committee, 4 p.m., 28, Grosvenor Gardens, S.W. 1.

Sept. 13.—NATIONAL GAS COUNCIL.—Meeting of Central Executive Board. There will be no meeting of the Board or of the Central Committee of the Federation of Gas Employers during August.

Sept. 13.—B.C.G.A.—Meeting of the General Committee at 4 o'clock approximately, 28, Grosvenor Gardens, S.W. 1.

Sept. 14.—INSTITUTION OF GAS ENGINEERS.—Meetings of Purifiers Sub-Committee, 10.15 a.m.; Gasholders Sub-Committee, 2.30 p.m., 28, Grosvenor Gardens, S.W. 1.

Sept. 15.—S.B.G.I.—Meeting of Council in the afternoon.

Sept. 19.—INSTITUTION OF GAS ENGINEERS.—Meetings of Calorimeters Sub-Committee, 2.30 p.m.; Sir Arthur Duckham Memorial Fund Exploratory Committee, 4.30 p.m., 28, Grosvenor Gardens, S.W. 1.

Sept. 20.—INSTITUTION OF GAS ENGINEERS.—Meetings of Joint Research Committee, 10 a.m.; Liquor Effluents and Ammonia Sub-Committee, 2.30 p.m., 28, Grosvenor Gardens, S.W. 1.

Sept. 21.—INSTITUTION OF GAS ENGINEERS.—Meetings of Meters Committee, 10.15 a.m.; Tar Sub-Committee, 12 noon; Committee on the Admittance of Chemists to Corporate Membership, 2.30 p.m., 28, Grosvenor Gardens, S.W.1.

Sept. 22.—WALES AND MONMOUTHSHIRE ASSOCIATION.—Meeting at Porthcawl.

Sept. 26 to 28.—B.C.G.A.—Annual Conference at Leeds.

Sept. 30.—INSTITUTION OF GAS ENGINEERS.—Meeting of General Research Committee, 2.30 p.m., 28, Grosvenor Gardens, S.W. 1.

Oct. 4.—INSTITUTION OF GAS ENGINEERS.—Meeting of Sir Arthur Duckham Memorial Fund Committee, 3 p.m., 28, Grosvenor Gardens, S.W. 1.

Oct. 7.—NORTH OF ENGLAND ASSOCIATION.—Autumn Meeting.

Oct. 10.—INSTITUTION OF GAS ENGINEERS.—Meetings of Finance Sub-Committee, 2 p.m.; Finance Committee, 2.30 p.m.; Executive Committee, 3 p.m.; Benevolent Fund Committee of Management, 4.30 p.m., 28, Grosvenor Gardens, S.W. 1.

Oct. 11.—INSTITUTION OF GAS ENGINEERS.—Meetings of Council, 10 a.m.; Board of Examiners, 12.15 p.m.; Gas Education Committee, 4 p.m., 28, Grosvenor Gardens, S.W. 1.

Oct. 13.—INSTITUTION OF GAS ENGINEERS.—Meetings of Joint Lighting Committee, 11 a.m.; Gas Appliances Sub-Committee, 2.30 p.m., 28, Grosvenor Gardens, S.W. 1.

Oct. 20.—INSTITUTION OF GAS ENGINEERS.—Meetings of Refractory Materials Joint Sub-Committee, 11 a.m.; Pipes Sub-Committee, 2.30 p.m., 28, Grosvenor Gardens, S.W. 1.

EDITORIAL NOTES

More Gas Sold

EXPRESSED by a figure of percentage, the increase in the quantity of gas sold in 1931, as compared with 1930, by the authorized gas undertakings in Great Britain may not be very substantial, but in actual amount it is quite considerable. Published a few days ago (and procurable from H.M. Stationery Office or through any bookseller, at the price of 4s. net, postage extra), the Board of Trade official Return tells us that the quantity of gas made (including gas bought from coke ovens) by the 749 undertakings included in 1931 was 707 million c.ft. (0·2 p.ct.) more than the amount for 1930, while the quantity sold increased by 702 million c.ft., or 0·2 p.ct. Considering the times we have been passing through, this result may be regarded as highly satisfactory. The quantity of gas sold in 1930, as compared with 1929, showed a falling off of just under 1 p.ct. The results recorded for last year should be a source of encouragement to all concerned, as affording an indication of what may be expected with a return to more prosperous times. In addition to affording this encouragement to those who have at heart the welfare of the Gas Industry, the figures are valuable for the refutation they provide of the assertions advanced from time to time (either from lack of full knowledge of the facts, or because "the wish is father to the thought") that gas is a dying industry.

It has been mentioned above that the number of authorized undertakings included on the present occasion in the Return is 749, and this figure (comparing with 767 for 1930) bears the mark of present-day policy in the Gas Industry. During the twelve months under review, ten gas undertakings have been absorbed by others—namely, the Abingdon undertaking by the Oxford and District Gas Company, the Alton undertaking by the Farnham Gas and Electricity Company, the Bedworth undertaking by the Coventry Corporation, the Elstree undertaking by the Watford and St. Albans Gas Company, the Henley-on-Thames undertaking by the Yorktown (Camberley) and District Gas and Electricity Company, the Kingston-upon-Thames undertaking by the Wandsworth and District Gas Company, and the Bawtry, Dinnington, Staveley, and Whitwell undertakings by the South Yorkshire and Derbyshire Gas Company. The undertaking of the last-named Company has been included in the Return. The ten undertakings of the Lanark County Council, having been consolidated, are shown in this Return as one undertaking.

The quantities of gas made and sold by the undertakings are shown in both cubic feet and therms, if the undertakings were authorized to charge during the whole or any part of the year for heat units supplied. The number of therms made is based on the average calorific value supplied as officially ascertained, but in cases where no test has been made the figure shown is based on the declared calorific value. The number of therms sold is based on the declared calorific value in the case of undertakings authorized to charge on a thermal basis, and the number of therms sold by those undertakings during 1931 was 1,387,032,673. In the case of undertakings not so authorized, an estimated figure, based on a calorific value of 500 B.Th.U., has been inserted in the Return in italics, and the number of therms as so estimated amounted to 2,794,125. The total number of therms sold by all undertakings during 1931 was accordingly 1,389,826,798.

On another page of this issue, the 1930 and 1931 figures are reproduced from the comparative table in the Return giving particulars relating to the manufacture and supply of gas. This table shows that the total quantity of gas sold in the past year was 290,693 million c.ft., while the figures for the preceding twelve months were 289,991 millions. Roughly speaking, the sales to prepayment consumers in the year dealt with in this Return increased from 107,964 million c.ft. to 110,510 millions; but the sales to ordinary and power consumers, &c., reflect to some extent the depressed industrial conditions by a reduction from 170,737 million c.ft. in 1930 to 168,394 millions in 1931. We are told by a writer in a contemporary devoted to the interests of electricity that "hardly a week passes without the change-over of street lamps somewhere from gas to electricity." This must be a quite recent development, because, according to this official Return, the quantity of gas sold for public lamps in 1931 increased from 11,288 million c.ft. to 11,787 millions. Facts are stubborn things.

And More Consumers

THE increase in the quantity of gas sold already noted has been accompanied by a growth in the number of consumers of 214,395, or 2·3 p.ct. By the end of 1931, that is to say, the number of consumers who support our "decaying industry" had reached the colossal total of 9,558,229. Surely those whose inclinations are not towards the growth of the Gas Industry will be prepared to admit that it is dying gracefully! In round figures there has been during the past decade an increase in the number of gas consumers in Great Britain of 2 millions. Something approaching three-quarters of this increase has been in respect of prepayment consumers, who now far out-number the ordinary consumers. For 1931 the respective figures are: Prepayment consumers, 5,560,619; ordinary consumers, 3,997,610. In the past ten years the length of gas mains has been extended from round about 40,000 miles to 51,807 miles.

The quantity of coal used last year in the manufacture of gas, at 17,427,000 tons, was less than in any year since 1926. In 1930 the coal used was 17,669,000 tons. The decrease in the coal used last year was, as will be seen from the table, accompanied by some increase in the coke and oil used for water gas, the make of which was larger than in 1930. To be precise, a decrease of 986 million c.ft., or 0·4 p.ct., occurred in the quantity of coal gas made, but the water gas made increased by 1278 million c.ft., or 3·2 p.ct. The coal carbonized was less than in 1930 by 242,000 tons; while 14,000 tons more of coke and 4,051,000 gallons more of oil were used in the manufacture of water gas. The quantity of coke and breeze made was less than that made in 1930 by 181,000 tons, and the tar made was less by 2,080,000 gallons. There were 22,442 tons less of sulphate of ammonia produced.

The quantity of gas bought from owners of coke ovens during 1931 and distributed by statutory gas undertakings was 13,923 million c.ft., or 722 millions (5·5 p.ct.) more than in 1930. A list of the purchasing undertakings, with the quantities bought, is reproduced from the Return on a later page of this number of the "JOURNAL."

A Right Sense of Proportion

IT is anticipated that electrification of the Southern Railway between London, Brighton, and Worthing will soon be an accomplished fact; and with this electrification an extension of development to the north and west of Brighton is naturally to be expected. Just issued is the report of the Regional Planning Scheme of Brighton, Hove, and District, which illustrates in detail an important effort in town planning. The Advisory Committee was composed of men prominent in the public life of the district, and they have gone into the scheme with great thoroughness in provision for years ahead. The plan affects a large section of the South Downs and has interest for all classes of the community. The Downland is a precious heritage and an obvious asset to the region, and the preservation of its beauties, together with the wise control of development by zoning, has been

the first care of the Committee. The suggested area of preservation amounts to over 30,000 acres, and the total amount of land available for development to about 25,000 acres. The scheme is therefore not a minor one.

There is evidence in the report of a proper sense of proportion in regard to the part which electricity is able to play in modern life, and this evidence is all the more welcome as coming from men who would be the last to hamper the progress of electricity. The point they make is that the adoption of electricity in rural areas does not in itself necessarily represent progress, that electricity must be considered as an alternative source of energy, and that its distribution must not ruin such an asset as the natural beauty of the district in question represents. There is, perhaps, states the report, no more glaring example of " putting the cart before the horse " than that of rural communities being supplied with electricity before being given a plentiful supply of pure water and a water-borne sewerage system. An efficient water supply and a hygienic means of sewage disposal are as fundamentally necessary to healthy living conditions as are fresh air and sunshine; a supply of electricity is simply an extra amenity of life or alternative form of power which, although a useful aid, is not a necessity in securing healthy conditions.

The Advisory Committee's opinion on overhead distribution is clear enough from the statement that the region is quickly becoming a network of poles, pylons, and cables carrying electricity, " . . . the result being that the efforts made by local authorities to preserve the countryside, to retain the quaint charm of old-world villages, and to preserve the architectural and historic gems of the country, are seriously hampered by the action of electricity undertakings in constructing lines of steel pylons and cables across the countryside, and in erecting lines of wooden poles down the streets of our old-world villages."

Modern Continuous Verticals

To-day we conclude our report of the proceedings at the annual meeting of the Irish Association of Gas Managers held in Dublin the week before last, by publication of the paper by Mr. F. G. M'Elwee, of Coleraine, on " Vertical Retorts for Small Gas Undertakings." It is a contribution which is certain to appeal to all who are responsible for the progress of the smaller undertakings, and it brings out clearly some highly interesting points concerning carbonization in continuous vertical retorts—in particular by the Glover-West system. Perhaps the most important feature of gas-works practice of to-day is that the manager of the small concern has, with modern gas-making plant at his disposal, far greater opportunities than ever before of attending to the sales side. As a staunch advocate of carbonization in vertical retorts, Mr. M'Elwee emphasizes the ease with which a small installation can make gas of a consistent quality with a minimum of attention, though, of course, regular technical control is necessary. The point is that this technical control need not occupy the whole time of the manager, who is thus able to devote the essential attention to gas selling, without which no gas undertaking can hope to progress and withstand competition.

There are practical hints in plenty in the paper under review, which is undoubtedly an exceedingly useful one. The plant at Coleraine consists of four retorts of the Glover-West " New Model " design, and Mr. M'Elwee explains that great care is taken to maintain a distinct pressure within the retorts. This is certainly important. A vacuum within the retort causes dilution of the gas made with inerts and gives rise to deterioration of the retort walls. On the other hand, a slight pressure in the retort ensures that any cracks are quickly made up, prevents ingress of furnace gases, and, by keeping the steam in contact with the coke as long as possible, increases the efficiency of steaming. As for the heating of the setting, there are three producers designed to facilitate extension of the plant by a further unit of two retorts. The fuel gas from each producer rises to a common flue. Hence two of the producers can be in operation for the supply of any four of the retorts, and even all six retorts when not pushed for gas production. In connection with the producers, our readers will be interested in the author's comments on effective grate area.

Another point emphasized by Mr. M'Elwee is the flexibility of operation of the plant. " We have," he remarks, " been able to operate with a maximum throughput per retort of 4 tons 3 cwt. and a minimum of 2 tons 19 cwt. This flexibility of the individual retort shows how mistaken is the idea that the relatively smaller number of retorts is a disadvantage." Then there is the simplicity of working. For example, scurfing no longer is a bugbear. In the summer the daily demand for gas can be met by two retorts, and no difficulty is experienced in putting 50 p.ct. of the gas-making plant temporarily out of commission for scurfing. Finally, with the modern vertical retort installation, the man responsible for its working is no longer dependent upon human whim, but, instead, can place reliance on control instruments. This feature has, we know, been mentioned before now, but it merits emphasis; and we cannot do better than quote the author on this matter:

" The continuous vertical retort is an instrument in the hands of the manager which he can control himself, and that without any labour except of the mental kind for which he is fitted. In other words, control is a scientific operation kept in check by records and gauges which can readily be organized to give complete control. As long as the several operations are carried out to time table and in accordance with the instructions which can be drawn up beforehand, there is no difficulty in maintaining constant and suitable conditions in the retort house. It is sometimes objected that the vertical retort requires more skill and attention on the part of the management than, say, horizontal retorts, and this is true to the extent that, if the best results are to be obtained, technical skill and ability must be applied to their control; but surely it is to the advantage of the gas engineer that this should be so, that he should be equipped with plant which will give a return for the skill expended upon its control—and it should be noted that there is not more, but less, skill required in the manual operation of the vertical retort. It is the skilful control of the manager which is readily rewarded with results far beyond the reach of the older forms of carbonizing plant."

Gas in Poland

Poland is naturally proud of her recently recovered nationality, and all who watch her heroic efforts to re-establish her economic prosperity on the right lines cannot fail to take note of what she is doing with her Gas Industry. In such a struggle as hers it is inevitable that the politician shall have a good deal to say, and politicians, for some (presumably) occult reason, appear to have an ineradicable tendency to identify economic and industrial advance with giant electricity stations, arc lamps, and push-buttons. Poland would seem to be refreshingly free from this obsession. At any rate, Warsaw is going ahead with the development of its gas supply, and though there is a slight decrease for the year's working in the total quantity of gas sold over the whole country, which is not surprising in this time of world depression, there are several towns where an increase has been recorded, notably Torun with 5·5 p.ct.

The Fourteenth Annual Congress of Polish Gas and Water Engineers, of which we publish this week an account communicated to us by a promising young gas engineer, Mr. J. Malecki, who lately spent some time in this country studying our own Gas Industry, was opened by the President, Mr. W. Rabczewski, on a note of firm courage and undaunted optimism. Of the forty papers read, eighteen were devoted to the Gas Industry, and these showed that the gas engineers of Poland are interested in and concerned with pretty much the same sort of problems as those which confront us here. Street lighting shares the place of honour with problems of works management and manufacture. Dr. Swierczewski is putting up a great fight for fair play in the street lighting of the Capital City, and, no doubt, he will be heartened by the victories won in London and the strong position of gas lighting in Paris. Undue Governmental interference, which threatens to take the form

of a periodical checking of the gas meters in use, is being intelligently resisted.

Mr. Malecki himself contributed a paper which takes the novel form of a short-period efficiency test of the continuous vertical retort bench at Warsaw. He has no doubt done his best to summarize the immense number of observations which are implied in such an attempt to reduce so complicated a process as carbonization with "steaming" and waste-heat recovery to a basis comparable with a steam boiler trial, but we do not know whether he has succeeded in producing figures of real value. We are afraid that there is far too much time-lag between the operation and the result for accurate determinations to be obtained in so short a time as eight hours.

Mr. Malecki draws comparisons with the similar work carried out by Prof. Ward and Dr. Perna, but we should bear in mind that Prof. Ward's calculations are based on observations extending over a month, and Dr. Perna's on a period of 24 hours.

Still, if the absolute value of the figures is doubtful, there is no question about their relative value and significance. They do show that the Warsaw Gas Works is conducted on sound scientific lines and that the system of carbonization, that of the continuous vertical retort, developed and brought to so high a pitch of excellence and efficiency in Britain, is able to hold its own among its Continental rivals. In this branch of industry at least Britain has kept the lead, and, if due consideration is given to the slightly different conditions in the fuel requirements of different countries and climates, there is no good reason why she should not keep it.

CORRESPONDENCE

Holding-Down Bolts of Disc-Type Gasholders

SIR,—After reading the article by Mr. A. Gadd, published in the June 29 issue of the "JOURNAL," entitled "Holding-Down Bolts of Disc-Type Gasholders," it is my opinion that some parts of the theory as presented should not be permitted to go unchallenged.

In discussing the variation of wind pressure with height of holder, Mr. Gadd introduces quite a refinement in holder design which does not seem justified, by assuming this wind variation to follow a parabolic law. From an inspection of fig. 1 it is clear that this method of variation cannot be correct. Using this distribution law, the wind pressure on some particular element at a given distance above the ground depends upon the total height of the holder, due to the fact that the vertex of the curve, according to Mr. Gadd's calculations, is located at the top of the holder regardless of the height of the holder. If another element is considered at the same distance above the ground, except on a much higher or lower holder, the wind pressure on the element considered would have a different value. Experiments show that wind velocity, and therefore wind pressure, do vary with height above the earth's surface, but the variation does not follow the square parabolic law, and the vertex of the curve is not limited to the top of the holder as shown in fig. 1. (See "Wind Design of Tall Buildings," by Albert Smith, "Eng. News-Rec.," June 11, 1931.)

Also, any refinement that could be made by Mr. Gadd in the distribution of wind pressure along the vertical height of the holder can easily be offset by his assumption of wind pressure distribution around the circumference of the holder.

There seems to be no reason why the total force or "drag" on a polygonal shell of numerous sides should differ much from the total force on a cylindrical shell. Mr. Gadd's calculations show a "force coefficient" of 0·73 for the polygonal shell as compared to 0·57 for the cylindrical shell. The writer feels sure that adequate tests on a polygonal shell will show a wind pressure distribution curve very similar to the wind pressure distribution curve as experimentally determined for the circular shell (see Mr. S. M. Milbourne's article "Spiral Gasholders," "JOURNAL," Jan. 27, 1932). Mr. Gadd's assumed pressure distribution neglects entirely the suction forces which are known to exist around the sides and back of the holder. These forces will certainly exist on the many-sided polygonal shell as surely as they do on the circular shell, due to the small angle between adjacent panels on the polygonal shell.

The validity of Hutton's formula for determining the wind pressure on a plane set at an angle with the direction of the wind has been questioned from time to time, and when a series of planes is considered, such as the polygonal shell, the formula probably does not apply. Therefore, any force coefficient calculated by the application of this formula is probably in error.

Of still greater importance is the error in the expression

$$\frac{D(N+4)}{8}$$

used by Mr. Gadd in calculating the uplift on the holding-down bolts. The writer has investigated Mr. Gadd's original article of 1923 and has found the correct expression to be

$$\frac{DN}{4},$$

this correct value having since been brought out indirectly by Mr. S. M. Milbourne in the Aug. 3 issue of the "JOURNAL." The use of the correct expression necessarily means a calculated uplift due to wind of approximately one-half that used by Mr. Gadd. However, this decrease in uplift is partly off-set by the American practice of using a larger average unit wind force on the projected area of the holder than used in Great Britain.

In reference to the dead weight of the disc-type holder shell, it may be interesting to know that this weight varies from about 12 to 15 lbs. per square foot, depending upon the size of the holder—and not 43·6 lbs. as suggested in Mr. Gadd's article. After the roof and shell dead load is deducted from the uplift due to overturning from wind, there still remains a net uplift on the foundation of considerable magnitude. The holding-down bolts are therefore quite important in this type of structure.

Yours, &c.,
J. RICHARD DORSEY,
Assoc.M.Am.Soc.C.E.

3012, *Beverly Road,*
Baltimore, Maryland,
Aug. 17, 1932.

SIR,—I observe that Mr. Gadd is desirous of bringing this correspondence to a close, but I am sure he would not wish this to be done until all element of doubt as to the validity of his formula for maximum pressure on roller axles of spirally guided gasholders has been removed.

It is not correct of Mr. Gadd to say that I have evaded the question at issue, as I have made a special point, in all my correspondence, of not only answering Mr. Gadd's questions, but also of enlarging upon them, in order to make the position clear to your readers. The question of triangles being similar when two sides only were parallel was queried in my last letter, but Mr. Gadd will see that I stated "when the *sides* are parallel" the triangles are similar. This must obviously be the case, since the resistances lie in the same inclined plane after strain has taken place.

I admit that I have substituted the word "displacement" in place of what Mr. Gadd has incorrectly termed "resistance," and my reasons are clearly indicated in my last letter of criticism.

In my previous letter, I have shown where Mr. Gadd made his initial error and in what manner this could be rectified in reducing the terms given in his formula. In concluding this discussion, I therefore propose to apply a simple mathematical test to Mr. Gadd's equation, which shows that the formula for maximum axle pressures cannot be substantiated under any pretext whatever.

There is no question that the overturning moment due to wind and snow equals the moment of resistance due to the roller axles. This may be stated in the form of an equation, using the same notation and the same expressions as Mr. Gadd (see "JOURNAL" for June 29, 1932).

$$\text{Overturning moment} = \text{moment of resistance}$$

$$D\left(8H^2 + \frac{D^2}{3}\right) = \frac{aD(N+4)}{8}$$

Now for the purpose of test, suppose that there are no

axles or carriages operating on the floating holder; it is obvious the structure would overturn, since there is no resistance offered. It cannot be disputed that the number of carriages (N) is absolutely necessary in forming any resistance to overturning. If, therefore, we write N = O, the expression for momental resistance should equal zero; but according to Mr. Gadd's equation, the moment of resistance = $\frac{aD}{2}$.

This implies that, when there are no means of guiding the floating holder, a resistance is still offered to its overturning moment—a condition which is, of course, absurd.

I do not wish to discourage Mr. Gadd from writing articles, or to cast a stigma of doubt on any further papers he may contribute, but I would commend to his most serious study the simple method of checking the validity of formulæ by substitution. Had such a course been adopted in this instance, the mistake would have been located before publication, and much confusion and annoyance would have been spared.

Yours, &c.,
S. M. MILBOURNE.

31, *Warren Road,*
Cricklewood, N.W. 2,
Aug. 27, 1932.

Sampling of Coal

SIR,—With reference to the Editorial in the "JOURNAL" of Aug. 17, may I ask you to refer to the correspondence published in the "Journal of the Institute of Fuel" of June, 1932, p. 347?

It is most unfortunate that Mr. Simpkin's paper is being taken by the Technical Press as a condemnation of the B.S.I. Specification. Simpkin's work itself is very incomplete compared with the enormous amount of corporate research work which was carried out by the Sampling Committee before the publication of the Specification, and it only relates to that part of the Specification which was definitely qualified by the recommendation on p. 7 of the Specification.

The statement in your Editorial (line 16) that "this Specification may hold for large coal or washed gradings . . . but it is not reliable for the sampling of wagons of dry slack" is inexact without further qualification to the effect that it refers *only* to the sampling from *the tops of wagons;* and it will do a lot of harm.

The Specification says that coal wherever possible should be sampled in motion. Detailed methods of doing this are given, and these methods are thoroughly reliable, as has been shown by numerous tests.

In the interests of promoting reliable sampling I would be pleased if you could give publicity to this letter and remove any false impression that the method recommended by the British Standards Institution is not reliable.

Yours, &c.,
ERNEST S. GRUMELL,
Chairman (on behalf of Committee responsible for the preparation of the Specification).

Imperial Chemical Industries, Ltd.,
Winnington, Northwich,
Aug. 23, 1932.

Gas and Electricity in Competition

SIR,—From recent copies of your publication it is easy to see that competition between electricity and gas in Great Britain is getting somewhat on the lines of local or village football—very keen, but at times not very clean. It appears to me, though, that if the various Gas Associations were to handle their side in the proper manner, the inherent love of fair play for which the Englishman takes second place to no nation would create an atmosphere of complete trust with gas manufacturers and allow the fight to be conducted on a more even balance.

The gas manufacturers and suppliers throughout the country should stand solid with a bold front, and unanimously agree to demand that the Government give them the same financial consideration and help that they have devoted, and are devoting, to electricity. At the same time they should emphasize the millions of pounds sterling invested in the respective utilities, together with figures showing the numbers of the public receiving benefits from either electricity or gas according to the money invested, and let shareholders of gas companies throughout the country understand very clearly that this subsidy, or grant, or State-aid, whatever you care to call it, will ultimately mean a diminishing value of their capital invested in gas. Then the public would see things differently. I do not think it is criminal to suggest that the gas suppliers give notice that they will cease manufacture, &c., and explain that without equal treatment—lack of which has already led to, and must lead to, further unfair competition—the Gas Industry will be strangled in the long run.

The present attitude is plainly that the Government is assisting electricity from the public purse to fight gas competition. Gas has for years past been bound hand and foot by legislation which has protected the public to the hilt and given them a straighter deal than the Government has allowed the gas companies themselves to receive. Then a competitor comes along obtaining help from influential quarters. The Government puts further pressure on gas, at the same time giving electricity all possible assistance.

I am not a Communist at all, but really there are times when a strike against tyrannical oppression appears justifiable; and certainly this appears a time when gas should appeal very definitely for fair play and honesty. Failing this being granted to them, the Gas Industry would be more than justified in showing their strength by refusing to carry on a one-sided fight which will result in disaster in the end.

Competition is healthy, but State-aided competition against private enterprise must stink in the nostrils of honest men. It will prove expensive, and will not benefit the public in the end; and the longer the struggle is continued without open revolt, so will the difficulty of taking action increase, for a long suffering public will ask, "Why did you not open our eyes to this danger when it started, and before it got its octopus-like tentacles all over the country and we had allowed taxes to be raised for such an unfair purpose, and to such a staggering amount"?

Some readers may think this letter rather revolutionary, but for some years past I have been fighting peculiar, one-sided competition; and when I see companies losing ground to State-aided competitors, I wonder where it will all lead to?

Yours, &c.,
"QUERICUS."

Aug. 9, 1932.

REVIEWS

GUIDE TO THE ORDERING AND TAKING OVER OF PRODUCERS FOR COKE OVEN PLANT.*

This guide is issued under the same auspices as that dealing with coke-ovens ("JOURNAL," 1931, 196, 537), and though only intended to cover producers supplied for use with coke-oven plant, should nevertheless be of general interest. In England, it is exceptional for producer gas to be used for the under-firing of coke ovens, but conditions may alter if the use of coke ovens in gas-works becomes more general. The items which may form the subject of guarantees are, primarily, the throughput of coke, the efficiency of the producer, and the calorific value and dust content of the gas. Other features, which may be included, are the grading of the coke, the steam consumption, the output of the blower, the power requirements, the water required for cooling and for cleaning the gas, and the steam production in cases in which steam is generated in the producer jacket or from a waste-heat boiler. As regards efficiency, three formulæ are given for (1) thermal efficiency, (2) effective efficiency, and (3) efficiency of gasification.

General directions for the execution of guarantee tests are also included.

* Richtlinien für Vergebung und Abnahme von Schwachgaserzeugern für Kokereibetriebe. Aufgestellt vom Kokereiausschuss des Vereins für die Bergbaulichen Interessen, Essen und des Vereins Deutscher Eisenhüttenleute, Düsseldorf. [Essen, 1932, Verlag Glückauf, G.m.b.H. Pp. 24, price RM. 1·75 unbound.]

PERSONAL

Diamond Weddings.

Last week Mr. and Mrs. HENRY TOBEY, of Malton, celebrated their diamond wedding. Mr. Tobey is well known for his services in connection with the Malton Gas Company. For over forty years he held the position of Manager and Secretary. In addition to serving the Malton Company, Mr. Tobey was appointed Engineer to the Filey Water and Gas Company. He was President of the North of England Gas Managers' Association in 1886, and again in 1911. For over twenty years he served on the Malton Urban Council, occupying for a term the office of Chairman.

* * *

Mr. and Mrs. JOHN ROGERS, of Rose Cottage, Crooked Well, Kington, celebrated their diamond wedding last week. Mr. Rogers, a native of Gloucester, was the first Manager of the Gas-Works at Fontenay le Comte, Vendee, France. In 1875 he went to Kington as Manager of the Gas-Works, an appointment he held for 44 years before his retirement.

* * *

Changes at the Westminster Technical Institute.

Mr. J. STUART KER, B.Sc., Assoc.M.Inst.C.E., the Principal of the Westminster Technical Institute, has retired after 25 years' service in that capacity. The Westminster Technical Institute possesses the largest department of Gas Engineering and Supply in the country. Last year more than 1200 students were attending either part-time day or evening classes in the various courses of the Institution of Gas Engineers' Education Scheme and the Training Scheme of the Gas Light and Coke Company.

Mr. Stuart Ker has worked in close co-operation with the Education Committee of the Institution of Gas Engineers, and did much to foster the scheme in its early days. The high percentage of passes and the possession of the first 1st Class Gas Supply Diploma candidate are proof of his success.

Mr. Ker has an able successor in Dr. J. N. LONG, M.I.Mech E., late Head of the Engineering Department of the Borough Polytechnic. Dr. Long has been appointed Principal of the Institute, which post includes the duties of Head of the Department of Gas Engineering and Supply. In this Department he will be assisted in a part-time capacity by Mr. R. N. LEFEVRE, Assoc.M.Inst.Gas E., of the Gas Light and Coke Company's Research and Training Section, Watson House.

* * *

A Dundee Success.

Mr. JAMES M. DOW, a member of the Technical Staff at the Dundee Corporation Gas-Works, has just won the Armitstead Medal presented annually to the most distinguished student in a completed course at the Dundee Technical College. This is the first time that the Medal has been won by a student in Gas Engineering.

OBITUARY

The death took place last week at a Glasgow nursing home of Mr. H. MARTIN, a Director of the Coatbridge Gas Company. He was a Justice of the Peace for Lanarkshire and an ex-Magistrate of Coatbridge.

THE NEWS OF THE WEEK

European Gas Company, Ltd.—The Directors have decided to pay on Oct. 1, 1932, an interim dividend of 2½ p.ct., free of income-tax. Last year an interim dividend of 2 p.ct., free of income-tax, was paid.

The Westminster Technical Institute will be open during the week commencing Sept. 19 next for the enrolment of students in all grades of the Gas Engineering, Gas Supply, and Gas Fitting Courses, when the staff will be available to advise prospective students on all matters relating to gas education.

The Société Intercommunale Gasbedeeling Antwerpen-Hoboken (I.G.A.H.) is the name of a new Company which has lately been formed in Antwerp with a capital of 100 million francs, or about £800,000 at the current rate of exchange, to acquire and carry on as a joint concern the Gas Undertakings in Antwerp and Hoboken.

Swiss Gas and Water Engineers' Association.—The annual meeting of the Association is to be held in Lucerne from Sept. 10 to 12 next, when among the papers to be read are one by Herr Escher on "The Reconstruction of the Zurich Gas-Works" and one by Herr Gunther on "The High-Pressure Gasholder Installation at the Lucerne Gas-Works."

The Contract for Lighting the Street Lamps in Hadleigh during the coming winter has been secured by the Hadleigh Gas Consumers' Company, Ltd., in competition with electricity. There are sixty-three lamps to be lighted at an inclusive charge of £200. The price of gas in Hadleigh is 6s. per 1000 c.ft., a reduction of 3d. per 1000 having been made at the commencement of the present quarter.

Scottish Gas Prices.—The price of gas has been reduced at Port-Glasgow from 4s. 9d. per 1000 c.ft. to 4s. 7d. for ordinary consumers, and from 5s. 3d. to 5s. 1d. for prepayment consumers, as from the December survey. At Aberdeen a new rate has been fixed which will mean a reduction of 2s. 6d. on the first 10,000 c.ft. of gas used, 12s. 6d. on the next 50,000 c.ft., and £1 14s. 7d. on the next 250,000 c.ft.

The West Kirby Urban Council has decided, on the recommendation of the Finance and General Purposes Sub-Committee, to accept £4500 from the Wallasey Corporation for the gas rights in the portion of the parish of Saughall Massie which is proposed to be added to Wallasey under the re-distribution scheme.

The Various Gas Undertakings in Switzerland continue to record an increasing output. Thus, the annual report of the Municipal Gas Undertaking in Berne for last year shows that the production during the twelve months reached a total of 639 million c.ft., contrasted with 586 millions in 1930. About half of this increase of about 8 p.ct. is attributed to the gas used at the Sports and Hygiene Exhibition held in Berne during last year, and the other 50 p.ct. to the normal growth of the demand for private consumption.

Sanitary Inspectors' Association.—The 45th Annual Conference of the Association will be held at Colwyn Bay from Sept. 5-10. Among the discussions on Wednesday, Sept. 7, is one on "Gas Appliances—Arrangement and Ventilation," to be introduced by Mr. A. Tyler, City of London. Any representatives of the Gas Industry who desire to attend the conference may do so on registering as delegates, the fee for which is £1 5s. The conference will be under the Presidency of Sir Leonard Hill, F.R.S., and information, &c., may be obtained from the Secretary of the Association, at 27a, Moreton Street, London, S.W. 1.

Town Gas as Fuel for Motor Vehicles.—In addition to the Paris Gas Company, demonstrations in connection with the use of gas for the driving of motor vehicles are at present being made in France by the gas-works authorities at Boulogne-sur-Mer, Orleans, and Lille. M. E. Wibratte, in the course of a paper recently read at Lyons, expressed the view that there is a big future for the use of town gas for motor vehicles, and that the development of the use of compressed gas will eventually necessitate the production by gas-works of two sorts of gas—ordinary lighting gas of 4500 calories per cub.m. and a gas of 6000 calories per cub.m. for compression into cylinders and other transportable holders for traction purposes.

Particulars Relating to the Manufacture and Supply of Gas

By Authorized Gas Undertakings in Great Britain for the Year 1931

As Shown by the Board of Trade Return

Year.	Number of Authorized Undertakings Included in Return.	Quantity of Gas.							Length of Gas Mains.
		Made.			Sold.				
		Coal Gas.	Water Gas.	Total Made.	To Prepayment Consumers.	To Ordinary and Power Consumers, &c.	For Public Lamps.	Total Sold.	
		1000 C.Ft.	1000 C.Ft.	Million C.Ft.	1000 C.Ft.	1000 C.Ft.	1000 C.Ft.	Million C.Ft.	Miles.
1920	798	214,703,118	36,932,530	‡	77,911,168	150,562,911	6,928,745	235,403	38,847
1925	781	231,347,681	48,173,291	288,616*	92,747,287	163,059,081	9,950,985	265,757	43,178
1930	767	255,336,236	39,525,450	313,046*	107 964,634	170,737,354	11,288,866	289,991	50,218
1931	749	254,350,650	40,803,280	313,753*	110,510,440	168,394,815	11,787,528	290,693	51,807

Year.	Materials Used in Manufacture of Gas.			Quantity of Residuals Made.			Number of Consumers.		
	Coal Carbonized.	Coke for Water Gas.	Oil.	Coke and Breeze.	Tar.	Sulphate of Ammonia.	Prepayment.	Ordinary.	Total.
	1000 Tons.	1000 Tons.	1000 Gallons.	1000 Tons.	1000 Gallons.	Tons.			
1920	17,566	‡	‡	‡	‡	‡	4,030,647	3,417,685	7,448,332
1925	17,031	1153	61,383	11,398	194,168	125,874	4,446,618	3,753,837	8,200,455
1930	17,669	790	49,073	11,913	214,762	125,443	5,354,547	3,989,287	9,343,834
1931	17,427	804	53,124	11,732	212,682	103,001	5,560,619	3,997,610	9,558,229

* Including "Other Gas" and "Coke-oven Gas." ‡ Information not available.

Coke Oven Gas Purchased by Gas Undertakings.

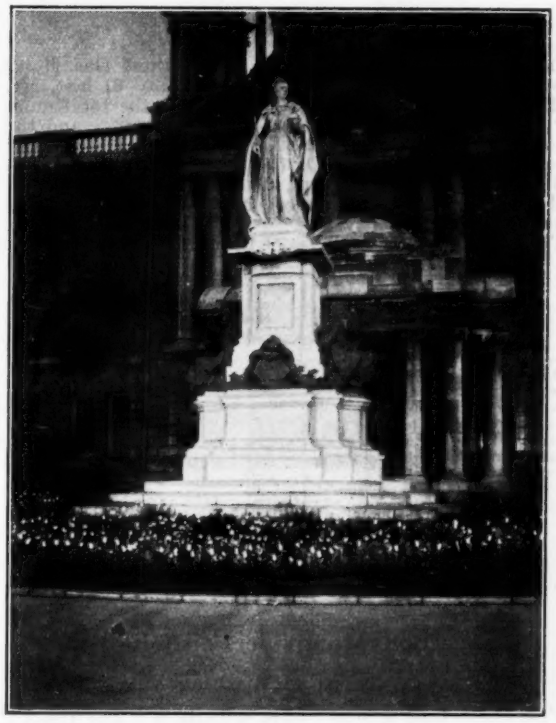
A table in the Board of Trade Return for 1931 (just published) shows that the following quantities of gas were bought from owners of coke ovens by authorized gas undertakings in Great Britain:

—	1000 C.Ft.
ENGLAND AND WALES.	
Accrington District Gas and Water Board	569,072
Ackworth, Featherstone Purston, and Sharlston Gas Company	44,923
Burnley Corporation	536,991
Castleford and Whitwood Gaslight and Coke Company	159 600
Chesterfield Corporation	155,618
Clay Cross Gas ompany, Ltd.	36,131
Cleveland Gas Company	27,667
Eckington and Mosborough Gas Company, Ltd.	36 000
Garw and Ogmore Gas Company	18,892
Houghton-le-Spring District Gas Company	83,343
Kidsgrove Gaslight Company	55,565
Killamarsh Gas Light and Coke Company, Ltd	11,850
Leeds Corporation	162,513
Middlesbrough Corporation	1,147,825
Newcastle-upon-Tyne and Gateshead Gas Company	2,670,797
Nottingham Corporation	476,907
Ossett Corporation	146,770
Pontypridd U.D.C.	164,653
Rawmarsh U.D.C.	84,163
Redcar Corporation	107,965
Rhymney and Aber Gas Company	294,663
Rotherham Corporation	733,034
Sheffield Gas Company	4,893 915
South Yorkshire and Derbyshire Gas Company	153,223
Stocksbridge Gas Company	53,242
Swinton and Mexborough Gas Board	98,203
Tudhoe and Sunderland Bridge Gas Company	18,738
Wath, Bolton, and Thurnscoe Gas Board	109 698
Wombwell U.D.C	89,700
Worsbroughdale and Worsbrough Gas Light and Coke Company, Ltd.	30,695
SCOTLAND.	
Glasgow Corporation	751,100
Total	13,923,456

COMPARATIVE FIGURES.

Year.	Number of Purchasing Undertakings.	Quantity of Coke-Oven Gas Bought.
		1000 C.Ft.
1921	14	1,325,027
1925	21	4,797,752
1930	32	13,201,351
1931	31	13,923,456

High-Pressure Gas Lighting.



This excellent photograph, for which we are indebted to Mr. A. M'I. Cleland, Distribution Superintendent to the Belfast Corporation Gas Department, was taken at night by Mr. R. J. Welch, and has in no way been touched up. It shows the Queen's Statue in front of the City Hall, Belfast. The source of lighting was a group of high-pressure gas lamps fronting the entrance to the Hall. The flowers in the bed at the base of the statue should be particularly noted.

THE NEWS—continued.

Floodlighting of a Park and Promenade.

On Monday of last week the Gas Committee of the Southport Corporation gave a demonstration to the rest of the Town Council on the value of floodlighting with gas. The venue chosen was the entrance to Hesketh Park.

Seven different types of lamp were employed, each generating a high candle power and designed for a particular form of specialized floodlighting. It was pointed out that the great advantage of using gas is that the natural colours, particularly of the foliage, are shown up, and are not distorted.

It is hoped that if the scheme progresses, it may be put into practical use in various parts of the town, more particularly in connection with the flower borders on the sea front. The lamps would be concealed, and no doubt would add greatly to the attractiveness of that part of the town, enabling people to appreciate still more Southport's " permanent flower show."

Councillor Scott (Chairman of the Gas Committee) took the initiative in the experiment, and he was ably backed up by Mr. J. Bond (Manager and Engineer of the Corporation Gas Department), Mr. H. Jackson, and Mr. G. Illingworth.

Commenting on a demonstration on the following night, a local paper says:

" The effect on the Promenade was certainly entrancingly beautiful; the colours of the massed dahlia borders were picked out with the brilliance of high noon on a day of unclouded sunshine; and though at present the flood lighting is only in the experimental stage—and Mr. Bond is ' trying out ' a variety of types of lamp—the experiment is full of such promise that an extensive scheme for large areas of the Promenade is now certain to be considered. Those who have clamoured for a ' Brighter Southport ' have here a practical answer to their plea, and if the Gas Committee receive that support from the Council to which their enterprise entitles them, a new and permanent ' illuminations ' attraction to Southport will be added. Southport's parks and garden beauties peculiarly lend themselves to floodlighting."

Meter Testing in Glasgow.

In his report on the work of the Glasgow Gas Meter Testing Department for the year ended May 31 last, Mr. S. B. Langlands, the Inspector, states that the total number of meters tested during the year was 38,976, and the amount of fees collected £2430. These figures are an increase on those of 1931. Of the total number of meters tested, 11,944 were new meters, 26,572 were repaired meters, and 460 were sent in by gas consumers for certification as to correctness.

The following is an analysis of the faults and errors:

Nature of Fault.	New Meters.	Repaired Meters.	Meters Sent by Consumers for Certification.
Fast in registration	124	138	166
Slow in registration	25	166	58
Passing gas but not registering	2	19	3
Ceased to register (bound)	7	14	1
Leakage	5	18	6
Passing unregistered gas	..	5	7
Drawing lights (oscillation)	6	39	44
Excessive absorption of pressure	..	9	..
Other faults	..	10	11
	169	418	296

Carbon Monoxide Poisoning.

A Word of Warning.

There have been several letters recently in " The Times " advocating the use of a carbon dioxide-oxygen mixture for the treatment of sufferers from carbon monoxide poisoning. A warning note, however, is sounded by a correspondent in " The Times " of Thursday last:

" The correspondence initiated by Sir Robert Davis relative to the treatment of gas poisoning is most important, as the inhalation of oxygen-carbon dioxide mixtures is the only effective treatment at present known.

" Allusion has been made to the difficulty sometimes experienced in obtaining the necessary gases and apparatus without undue delay, and it seems worth remembering that there is one type of medical specialist who invariably has the materials at hand. Carbon dioxide has been used as a respiratory stimulant in anæsthesia for 23 years, and if an anæsthetist is available he can institute effective treatment for gas poisonig without loss of time. Alternatively the patient should be rushed to hospital, as carbon dioxide can now be obtained for resuscitation in practically every modern operating theatre—sometimes, indeed, being laid on from pipes.

" Finally, a word of warning is necessary for lay helpers. While most rescue apparatus is practically foolproof, it is imperative that makeshift devices using commercial carbon dioxide should not be employed. As a general rule it is unnecessary to use a stronger mixture than 10 p.ct. carbon dioxide in oxygen or air, while really concentrated mixtures and the pure gas are extremely dangerous, their inhalation frequently resulting in rapid death. It is obvious therefore that, unless a proper apparatus is available, the lay helper would be wise to avoid experimenting with odd cylinders of carbon dioxide."

Gas as an Ally of Coal.

In the first of a series of articles in the " Western Mail and South Wales News," Mr. J. H. Canning, Engineer and Manager of the Newport (Mon.) Gas Company, urges the coal industry to regard gas as a valuable ally. He says:

The restoration of the prosperity of South Wales depends, in great measure, upon the success of the " Back to Coal " movement. Bunker coal has been, to a great extent, displaced by foreign oil, and the latter fuel is now challenging the supremacy of coal on land. This is chiefly due to the greater ease with which oil is handled, and the manner in which it lends itself to automatic heat regulation. With a full appreciation of these facts, the coal industry has naturally considered the possibility of producing from its raw product, either by low-temperature carbonization or by hydrogenation, liquid fuels by means of which the competition of foreign oil may be met and countered. While it is vitally essential that research on these lines should be energetically pursued, it may be stated distinctly that some considerable time must elapse before home-produced oil can successfully compete with foreign oil, which, being a natural product, possesses an immense economic advantage. In the meantime, while the grass is growing, the steed is starving, and if the South Wales coal industry is to depend for its salvation upon the belated success of low-temperature carbonization or hydrogenation schemes, the outlook is indeed a sombre one. There is, however, another product of coal immediately available in all urban areas which possesses all the advantages and none of the disadvantages of oil, and by means of which this foreign competition can be successfully met. The product in question is coal gas, which for more than a century has continued to maintain its superiority as the cleanest, most efficient, and most manageable of fuels.

Modern Gas Cookery.

A series of highly successful gas cookery demonstrations was brought to a close on Friday last at the showrooms of the Smethwick Gas Department. A feature of these demonstrations was the automatic cooking of a whole meal at one time in a Parkinson " Newpark " cooker. On Wednesday last the Mayor of Smethwick (Alderman Mrs. E. M. Sands) used a new chain of office to bind the oven, in which was cooked a complete meal without attention. The demonstrator was Miss Crawford-Fox.

Alderman A. M. Williets, Chairman of the Smethwick Gas Committee, concentrated attention on two objects which the Department has in view. The first, he said, was to endeavour to extend the service which the Undertaking is rendering to the people of Smethwick through the Gas Department; the second was to enable the womenfolk to achieve through their cooking even greater wonders than had been possible in the past. He was quite sure that the women of their Borough appreciated the importance of economy in these very difficult times. But he was not quite so sure that as many as they could wish had regard to the difference between the efficiency of the present-day cooker and the cooker that was issued perhaps twenty years ago. He wanted to assure them that there had been very definite improvements—not only to be found in the appearance, though that was important they would agree, but in the matter of efficiency. The present-day cooker was infinitely superior to those that were issued some years ago. There were in the district served by Smethwick something like 17,000 to 17,500 houses, and among those dwellings there were distributed nearly 15,000 gas

cookers. He urged his hearers to consider carefully the facilities now offered to consumers by the Gas Department in regard to the installation of up-to-date gas cookers and other appliances.

Orders Received for Woodall-Duckham Plant.

A number of orders have been received by the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., for plant during the past three months.

The Gainsborough Urban District Council have ordered an installation comprising six 44-in. continuous vertical retorts in double line heated by means of a battery of two producers. The plant will be housed in a new steel-framed brick-filled retort house. The contract includes the provision of a coal and coke handling plant and a natural-draught waste-heat boiler. The Bishop's Stortford, Harlow, and Epping Gas and Electricity Company have placed an order for an installation comprising eight 62-in. Woodall-Duckham continuous vertical retorts heated by means of one battery of producers. The contract includes provision of a coal and coke handling plant; coke screening plant; coke storage bunkers; and a waste-heat boiler.

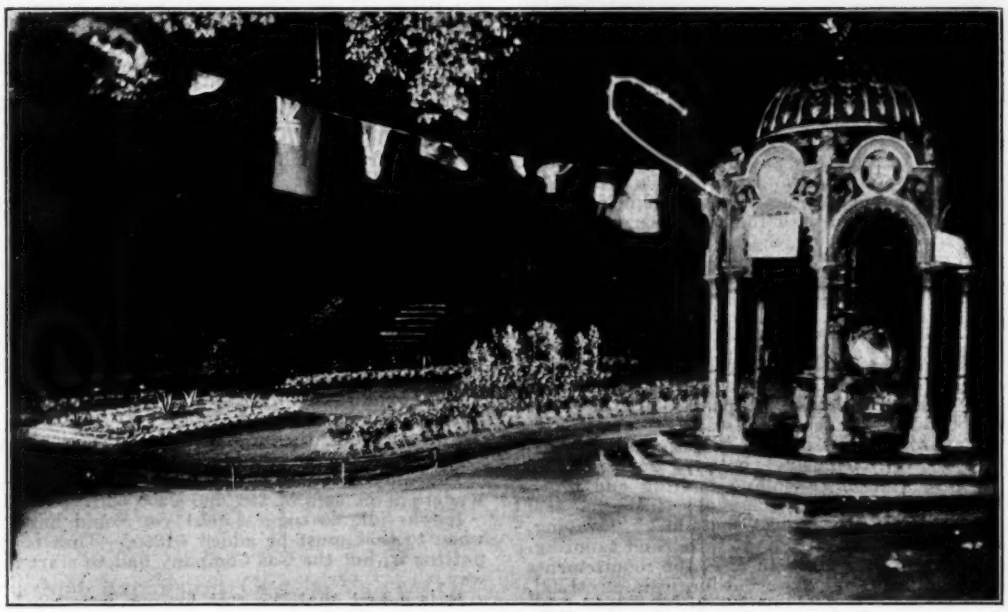
A large order for intermittent vertical chambers has been received from the Tottenham and District Gas Company. The new plant will comprise forty-eight 3¾-ton intermittent vertical chambers arranged in two benches, each of 24 retorts. The total capacity of the plant will be 373 tons of coal a day. The contract includes the provision of coal handling plant; elevated concrete coke wharf; coke handling, cutting, and screening plant; reinforced concrete coke storage bunkers; secondary screening plant; and two waste-heat boilers of the horizontal, induced-draught, fire-tube type.

Instructions have been received from the Birmingham Corporation Gas Department to proceed with an interesting re-construction scheme in which two benches at Windsor Street, Birmingham (at present comprising a total of forty-four downwardly-heated retorts), are to be reconstructed into sixty-six upwardly-heated retorts, each of larger carbonizing capacity.

The new plant will be divided into two benches, one containing thirty retorts, heated by a battery of five producers, and the second containing thirty-six retorts, heated by a battery of six producers. The total capacity of the plant will be over 400 tons per day, whereas the plant originally installed had only a capacity of 220 tons per day.

The Birmingham Corporation Gas Department have also placed an order for the re-construction of twenty-eight retorts at their Nechells Works.

GAS TO THE FORE FOR FLOODLIGHTING



[*Photo. by permission of the "Express & Star."*

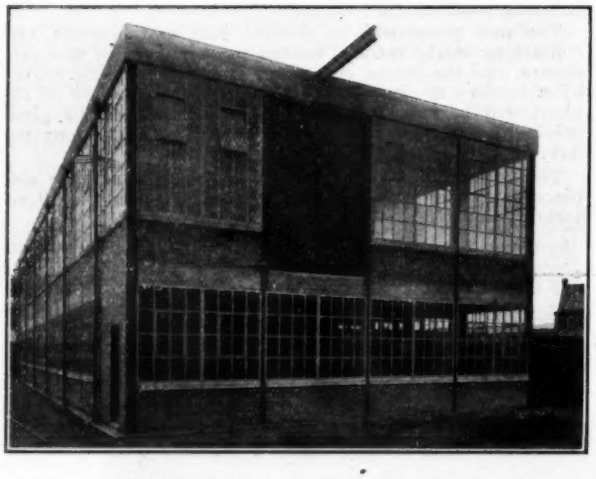
Illumination by two 12-light strip lanterns above and to the left of the camera, and the 6-light "searchlight" which can be seen under the drinking fountain.

Our photograph shows one effect of some extensive floodlighting by gas carried out by the Bilston Gas Company, of which Mr. H. S. Adams is Engineer and Manager. The scheme was undertaken in conjunction with Messrs. Foster & Pullen, Ltd., of Bradford, the occasion being the Bilston Floral Fête, which was held in the local park. The floodlighting was done in the main avenue of the park, and around the centre flower beds and a small pool. The main avenue was illuminated with one 12-light strip lantern suspended over the gateway, and two similar lamps, but with adjustable slatted stainless steel reflectors, placed on the ground at intervals along the avenue. One of the main flower beds and lawns was illuminated by two similar lamps with the slatted reflectors which were suspended in some trees opposite the lawn. The other bed was done in the same manner, but with the addition of a new 6-light cluster burner placed in a large circular lantern of stainless steel. This bed is shown in our photographs. The back of the large lantern referred to can be seen underneath the drinking fountain. A pool surrounded by shrubs was illuminated by one 12-light strip lantern with slatted reflectors placed on the ground and with eleven 1-light portable units concealed in the shrubs near the water's edge. The general effect was greatly admired, and much comment was evoked by the fact that the colours of the flowers, &c., were not altered by the gas light, Welsbach "Daylight" mantles being used. The whole of the illuminations of the Fête, including the interior of the tents and bandstand and the stage performances, were entrusted to the Bilston Gas Company. The tents, &c., were lit mainly with 3 and 6 light "Littleton" lamps; and the Floral Fête Committee were so pleased that they have asked the Company to undertake the job again next year.

THE NEWS—continued.

A New Pattern Shop at Deepfields.

The new pattern shop of Messrs. Cannon Iron Foundries, Ltd., recently completed at Deepfields, near Bilston, is a long steel-framed building of two storeys with flat roof, 120 ft. long by 35 ft. broad. The lower floor is used entirely for the storing of working patterns required in the foundry. The floor of this building is on the same level as that of the moulding shop, and communicates directly with the latter, the entrance to the foundry being close to the special department known as the pattern moulding shop. On this lower floor the patterns are stored in stalls of a special design, numbered and registered so as to give immediate access to any pattern required.



The whole building is heated throughout by steam pipes from a boiler fired with gas coke in the basement. A lift and stairs communicate between the pattern stores and the pattern shop itself, which occupies the upper floor. Owing to its elevated position the new pattern shop has thus exceptional advantages for lighting and ventilation. The shop contains a number of labour-saving machines, which are arranged in conjunction with the work benches, so as to give the maximum economy of time and labour in the execution of work of any kind.

Sir John Cass Technical Institute.

The new session of the Sir John Cass Technical Institute, Jewry Street, Aldgate, E.C. 3, which extends over about 36 weeks, will begin on Monday, Sept. 19, and students will be enrolled during the preceding week.

The Institute provides instruction in pure and applied mathematics, physics, chemistry, botany, zoology, biochemistry of fermentation (including malting and brewing), petroleum technology, fuel technology (including coal carbonization and gas manufacture), metallurgy, assaying, geology, modern languages, arts and crafts, and tailoring. The science courses are arranged to meet the requirements of those engaged in chemical, metallurgical, electrical, petroleum, and fermentation industries, and are held from 6 to 10 p.m.

Full facilities are provided in well-equipped laboratories for special investigations and research.

The instruction in experimental science also provides systematic courses for the examinations of London University, the Institute of Chemistry, and the Institute of Brewing.

The Principal or heads of departments will be pleased to advise intending students at the commencement of the session on the course they should undertake.

Modern Street Lighting.

Interesting sidelights concerning some of the problems of modern street lighting were given by Mr. Isaac Massey, Oldham's Lighting Superintendent, to members of the Rotary Club of Oldham at their weekly luncheon on Aug. 22.

The science of light as they now thought of it, said Mr. Massey, was due to discoveries of recent times—namely, incandescent gas lighting and electricity. These had accelerated the progress of street lighting out of all proportion to that of any other period.

If the art of illuminating engineering had made good progress, it was equally true to say the need for better street illumination had advanced at a greater pace. Modern fast moving traffic had made every square yard of main road into a veritable death trap, which called for the very best standard of illumination that an authority could afford. Good street lighting should be looked upon not as a luxury, but a necessity; in fact a duty, and a measure of safety not to be weighed with £ s. d.

It was generally recognized that in Oldham they had had for many years good street lighting, particularly in the case of the main roads. They had endeavoured, as far as their finances would permit, to keep pace with the new era in vehicular traffic by providing well-designed installations of electric lighting and also high and low pressure gas with candle-power outputs which would compare favourably with most lighting installations in the country.

The Lighting of Hailsham.

Ministry of Health Inquiry.

Whether a tender accepted by the Hailsham Rural District Council for street lighting was properly competitive, and whether the Eastbourne Gas Company were given the opportunity to tender on the same terms and conditions as the Eastbourne Corporation Electricity Department, were the principal questions discussed at a public inquiry held on behalf of the Ministry of Health by Lieut.-Col. L. F. Wells, an Inspector from the Ministry, at Hailsham last week.

The subject of the inquiry was the application to the Ministry of Health for sanction to borrow £1630 to defray the cost of the conversion of street lighting in Hailsham and Polegate from gas to electricity.

Mr. A. Carr (Clerk) represented the Rural District Council, while the Eastbourne Gas Company was represented by Mr. G. H. Lloyd Jacob, instructed by Messrs. Sherwood & Co.

Mr. Carr explained that tenders for the lighting were opened on July 11. The Gas Company's tender was £358 14s. for lighting, and improvements in lamps, and additional lamps, brought the total cost for the lighting season to £434. The Electricity Department quoted £92 16s. 7d. for the lighting, and a charge for conversion of existing columns of £1860. Over a period of five years the cost would be £372 per annum, and over a period of ten years £186 per annum.

Answering the Inspector, Mr. Carr agreed that nobody was asked in the first place to tender for ten years.

On July 20, continued Mr. Carr, a letter was received from the Eastbourne Gas Company offering to carry out the public lighting for ten seasons at a cost of £270 6s. per season. In the meantime the Council had decided to adopt the tender of the Electricity Department, and to meet the annual cost by raising a rate of 3d. in the £.

Mr. Lloyd Jacob: The Electricity Department first of all tendered for 38 weeks?—Yes.

And subsequently for a period of five or ten years?—It followed the first tender in the same letter.

The only comparison you can make between the two tenders is the sum of £92 and £300 odd?—Yes.

It was idle to suggest that you could have it for £92 when to that must be added £1860?—That is one way of putting it, but the Gas Company had to start in the same way.

It is a fact that the cost for one year would be £1860 *plus* £97?—But owing to the business acumen of the Eastbourne Electricity Committee we are allowed to spread it over 10 years. The Eastbourne Gas Company were invited to tender on the same basis as the Electricity Committee.

The Gas Company were always willing to tender on the same basis.

Concluding his address, Mr. Jacob said that the Gas Company were very large ratepayers in the parish and would, therefore, suffer in two ways. The Company had had no opportunity to put their offer in the form of a proper tender, as required, in his view, by the statute. It was his contention that this application should be refused, because the parish could have the streets properly lighted without any capital charge.

Coke Oven Production in 1930.

Details of the output of coke and bye-products and manufactured fuel trades in 1930 are given in Preliminary Report No. 18 of the Fourth Census of Production (1930) published as a Supplement to the "Board of Trade Journal" for Aug. 18.

The particulars for 1930 and 1924 given in the report relate to returns received on schedules for the Coke and

THE NEWS—*continued.*

Bye-Products and Manufactured Fuel Trades. Detailed returns were not required from firms that employed ten or fewer persons in 1930, and the particulars which follow, both for 1930 and for 1924 (except where otherwise stated), relate to firms that employed more than ten persons on the average. At the 1924 Census an aggregate of 136 persons, or 0·7 p.ct. of the total number employed in these trades, was recorded on returns dealing with production carried on by not more than ten persons on the average in the year. No production was recorded in Northern Ireland in 1924.

The figures for 1930 cover 133 establishments at which operatives were employed. Returns for 1930 are outstanding from firms that employed in 1924 about 250 persons, or 1·2 p.ct. of the total number recorded for that year by all firms that employed more than ten persons.

The quantity of foundry coke made in 1930 was 11,616,000 tons, valued at £9,664,000, as compared with 12,782,000 tons, valued at £16,810,000, in 1924. There was thus a decline of about 9 p.ct. in production in the later year. The output of manufactured fuel in 1930 was also about 9 p.ct. less than in 1924, the quantity made in the later year being returned as 1,144,000 tons, valued at £1,185,000, and in the earlier year as 1,255,000 tons, valued at £1,751,000.

Coal Tar, Coal Tar Products, &c.—The following table shows the values and quantities of coal tar, coal tar products, &c., made for sale in 1930 and 1924 at coke ovens and bye-product recovery plants, including those operated in conjunction with blast furnaces. It should be borne in mind, however, that the particulars shown represent only a part of the total output in Great Britain. Coal tar products valued in all at £4,064,000 were recorded for 1930 by tar distillers that made returns on schedules for the Chemicals, Dyestuffs, and Drugs Trades, the corresponding figure for 1924 being £4,885,000.

With regard to sulphate of ammonia, benzole, carbolic acid, and toluole, the standards of strength indicated in the above table and the footnotes thereto are those at which manufacturers were asked to return particulars of the quantities made by them. At the 1924 Census these standards were not adhered to in an important number of cases, and the particulars of quantity shown for these products should not be taken as more than approximations to the actual quantities made in that year when expressed in terms of the standards indicated.

Prices.—The average selling value of *foundry coke*, as shown by the returns, was 16·64s. per ton in 1930 and 26·30s. per ton in 1924. With regard to *manufactured fuel*, the average selling value was 20·72s. per ton in 1930 and 27·90s. per ton in 1924. The average values were thus lower in 1930 than in 1924 by 37 p.ct. in the case of foundry coke and by 26 p.ct. in the case of manufactured fuel.

Kind of Product.	1930.		1924.	
	Quantity.	Value.	Quantity.	Value.
	1000 Tons.	£	1000 Tons.	£
Tar—				
Crude	422·5	620,000	503·4	1,437,000
Refined	94·4	251,000		
Ammoniacal liquor	5·8	9,000	12·7	15,000
Coal tar products—				
Pitch	91·3	161,000	157·4	436,000
Sulphate of ammonia (20·6 p.ct. nitrogen)	173·1	984,000	186·2*	2,274,000
Benzole—	1000 Galls.		1000 Galls.	
Crude	16,904	771,000	38,061†	1,830,000
Refined	20,211	1,475,000		
Carbolic acid—			1000 Cwt.	
Crude (in terms of 60's)	131	13,000	27·1	20,000
Cresylic acid	206	19,000	‡	‡
			1000 Galls.	
Naphtha (crude)	·788	40,000	1,830	88,000
Naphthalene (crude), excluding naphthalene oil	1000 Cwt. 167·4	35,000	1000 Cwt. 191·5	54,000
Tar oil, creosote oil, anthracene oil, and other heavy coal tar oils	1000 Galls. 15,095	179,000	1000 Galls. 17,756	524,000
Toluole (in terms of 90's)	837	75,000	320	25,000
Other tar distillation products (including anthracene)	..	45,000	..	195,000
Total value	..	4,677,000	..	6,898,000

* In terms of 21·1 p.ct. nitrogen: equivalent to 190,700 tons in terms of 20·6 p.ct. nitrogen.
† In terms of 50 p.ct. benzole.
‡ Included in other tar distillation products.

Exports and Retained Imports.—The exports of foundry coke in 1930 amounted to 1,547,000 tons, or 13·3 p.ct. of the total production in that year, as compared with 1,848,000 tons in 1924, or 14·4 p.ct. of the total production. Retained imports were negligible in both years, being only 121 tons in 1930 and 122 tons in 1924. Exports of manufactured fuel were 1,006,000 tons, or 87·9 p.ct. of production, in 1930, and 1,067,000 tons, or 83·7 p.ct. of production, in 1924. Retained imports amounted to 245 tons in 1930 and 387 tons in 1924, and it is understood that these imports consisted to a considerable extent of fuel not made from coal, being thus quite different from the coal briquettes, which constitute the manufactured fuel produced in this country.

The number of operatives employed in 1930 was 21 p.ct. less than in 1924, while the number of administrative, technical, and clerical staff was 9 p.ct. less in the later year.

NOTES ON PLANT AND PROCESSES

Thermal Expansion Goggle Valve.

A new leaflet issued by Messrs. Ashmore, Benson, Pease, & Co., Ltd., of Parkfield Works, Stockton-on-Tees, illustrates and describes the McGee patent thermal expansion goggle valve, the sole licence for which the firm have acquired for the British Empire. The thermal expansion goggle valve is operated by means of thermal expansion or contraction of metal tubes, thereby opening or closing flanges to free or clamp the goggle plate. Expansion tubes have been used for many purposes, but in this design three tubes, equally spaced around the valve, produce a definite, positive, powerful force when steam or gas is admitted, the expansion of the tubes separating the valve flanges to allow easy swinging of the goggle plate. After the plate is swung, the heating element is turned off and the tubes allowed to cool normally or more rapidly by the admission of cold water, when the contraction of the tubes moves the flanges together to clamp the plate and close the valve.

The flange movement is accomplished by the mere turning of a small valve to admit the steam or water (which valves may be conveniently located near the ground level), and then the opening and closing of the large goggle valve can be quickly done by a pull on the operating chain provided for swinging the plate. The operating chain is direct-connected to a bronze worm gear unit, which is oil and dust-tight and is suspended directly underneath the goggle valve. This unit assures quick and easy swinging of the goggle plate and reduces the man power required to a minimum.

The leaflet clearly shows by means of diagrams and photographs the design and operation of the valve, while a list of recent installations indicates that the apparatus is being increasingly adopted.

The "Stator" Washer.

The patent "Stator" Washer, manufactured by Messrs. Newton Chambers & Co., Ltd., of Thorncliffe Ironworks, near Sheffield, is the outcome of many years of research and experience in the problem of washing gases. It has a high efficiency both in the completeness of the removal of ammonia, benzole, and naphthalene from the gas, and in the working up of the absorbing liquid to maximum strength. Briefly it is composed of a number of rectangular compartments, which are filled with ring packing over which the absorbing liquid is circulated, and through which the gas passes in a horizontal direction at a low velocity. An arrangement of spreaders and baffles in the compartments prevents by-passing of the liquid and ensures that the packing is highly "wetted." The whole arrangement results in maximum absorption from the gas, together with minimum back pressure.

Re-circulation from the sub-reservoirs which com-

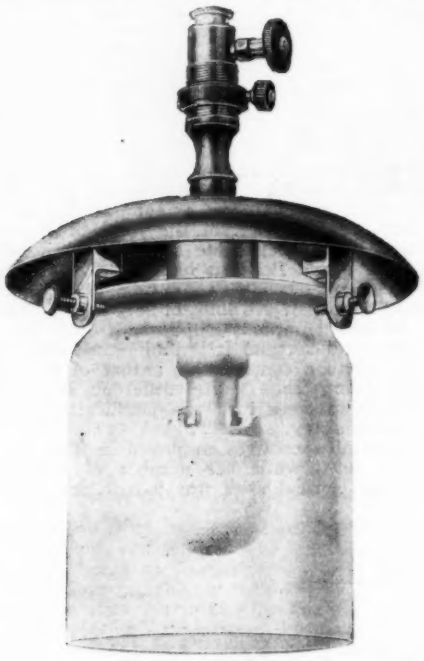
municate with the main reservoirs maintains a lower liquid level in the sub-reservoirs thus eliminating by-passing of the liquid and ensuring that every molecule takes part in the wetting of the packing, resulting in maximum absorption by the liquid. These washers can be constructed in steel or cast-iron to suit customers' requirements, and the features are low first cost and working costs; maintenance costs practically *nil;* it is economical in space requirements; and it has a long life.

While this washer may appear new to the Gas Industry in this country, it has been in operation for some years on the Continent and has proved itself to be very satisfactory. Such a washer has been in operation for three years on the manufacturers' coke oven plant, and has proved not only a most efficient but also a most economical plant for its purpose.

Preventing Ceiling Discoloration.

A gas lighting fitting designed to prevent the discoloration of ceilings and decorations, and which will accommodate bayonet or screw type globe and also silk shade, has been brought out by Messrs. Evered & Co., Ltd., of Smethwick.

The Howie Burner, as this new fitting is named, has a polished stainless steel deflector and gas and air regulators of solid brass rodding. The gas regulator is fitted



The Howie Burner.

with a large fibre wheel, and the air regulator with a long spindle and fibre wheel for ease of adjustment. The hand or wrist is not burnt when making adjustments. The air ring fitted above the air ports prevents the accumulation of dust and fluff, while a long fireclay nozzle with perforated disc, either No. 2 or No. 3 size, ensures perfect mixture and good superheat.

Test.—Burning for 1000 hours 2 ft. under a white board, the " Howie " Burner produced no appreciable discoloration.

Becker Ovens at Irlam.

A large new installation of Becker Coke Ovens, complete with bye-product recovery plant, started production at the Works of the Lancashire Steel Corporation, Ltd., Irlam, Manchester, on Aug. 9 last. The installation has been erected in connection with the development scheme of the Lancashire Steel Corporation, Ltd., steel plant. The battery of 51 Becker coke ovens is capable of producing 5000 tons of coke per week.

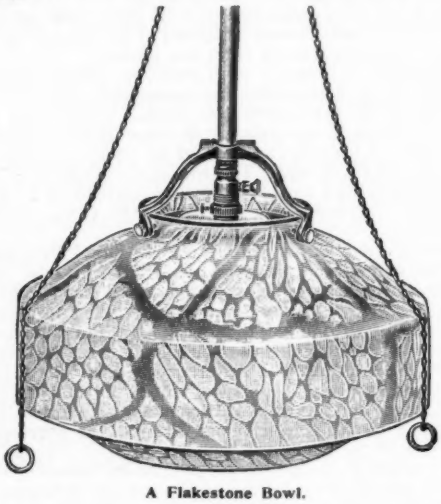
The new installation also includes a modern coal washery; coal blending plant; bye-product recovery plant; benzole recovery and rectification plant; and coke handling and screening plant.

The Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., have been responsible for its design and erection.

A Semi-Direct Pendant.

Messrs. Lighting Trades, Ltd., and the Welsbach Light Company, Ltd., of 51-55, Garratt Lane, Wandsworth, S.W. 18, have added many new items to their already extensive stocks of gas lighting equipment.

In the Gas Fitting Section pride of place must be given to a most attractive range of glass panel pendants, which strike a new note in decorative gas lighting. These can be supplied with either plain satin finished, or tinted glass. A special feature of these fittings is that the metal frames are collapsible, which facilitates the placing into position of the glass panels, and simplifies storage and transport problems.



A Flakestone Bowl.

In the Gas Shade Section the demands for shades made up of such materials as parchment, marbleoid, celastoid, and others of a similar nature, which are now enjoying a vogue, has been adequately catered for, and readers will find in the Lighting Trades range of patterns some most attractive designs. Many new and inexpensive designs have also been added to the range of glass shades and bowls, including a selection of British-made Flakestone globes, tinted in various colours.

Another fitting of interest (illustrated here) is the semi-direct pendant fitted with a 14 in. diameter open bottom Flakestone bowl, which is held in position by a cast-metal carrier fitted to the rod. By this method suspension chains are dispensed with.

Coke Oven Equipment.

It is of interest to note that Messrs. Ashmore, Benson, Pease, & Co., Ltd., of Parkfield Works, Stockton-on-Tees, have entered into an agreement with the Atlas Car and Manufacturing Company, of Cleveland, Ohio, for the exploitation in this country of their coke oven specialities, and the British firm have issued a new leaflet illustrative and descriptive of such equipment.

Among the apparatus dealt with is a three-hopper charging car designed for operating on top of bye-product coke ovens, which has a capacity of approximately 20 tons. Then there is a combined coke pusher, leveller, and door machine which may be so designed that all three operations can be accomplished with one setting of the machine. It embodies particular features ensuring accessibility of all parts for inspection, repairs, and renewals.

Further equipment described and illustrated includes a door-lifting machine and coke guide whereby these operations can be combined in one machine if desired, giving facilities for stripping or peeling the doors from the door frames. The coke guide portion maintains the column of hot coke in an upright position as it passes across the bench. A 50-ft. coke-quenching car with air-operated discharge gates is another interesting apparatus mentioned in the leaflet. This car has a capacity of approximately 14 tons, and is provided with four doors operated in pairs by means of two air cylinders suitably geared to operating shafts. Control can be effected from either end of the car by means of air valves mounted in the locomotive cab. The floor is of patented overlapping type allowing for expansion and contraction. It can be furnished with or without motor drive.

Also described is a quenching locomotive for coke oven service, which is of extra heavy design, with centrally located elevated cab and traction means of high-grade totally enclosed worm gearing to each axle.

Congress of Polish Gas and Water Engineers, Wilno, June 1-4

Communicated by
Mr. J. Malecki

In his opening speech Mr. W. Rabczewski, General Manager of the Warsaw Water Department, and Chairman of the Polish Association of Gas and Water Engineers, said that this was the fourteenth Annual Congress of the Association. These Congresses had been held in the different towns of Poland with a view to linking together all the engineers working in the gas and water industries, and in each case to connect the industries as a whole with the particular departments in the towns chosen for the annual meeting. This year the historic town of Wilno had been chosen in which to hold the Congress.

The Congress was attended by between 200 and 260 members, and 40 papers were read. Of these, 8 were of a general character, 18 related to the gas industry, and 14 to the question of water supply. Of the gas industry papers no fewer than 4 dealt with the subject of street lighting, while 4 papers dealt with the economy and management of gas-works and carbonization, 3 with the corrosion and protection of mains, and 2 with the proposed periodical inspection of gas meters by the Board of Weights and Measures (a proposal which seems to be rousing considerable resentment among Polish gas engineers). Other subjects dealt with in one paper each were naphthalene, ventilation of rooms in which gas is used, natural gas, water gas, and the influence of ash on coal analyses.

Distinguished representatives were present of the central and local governments, also those of the kindred associations of Czechoslovakia and Jugoslavia, the former of which was represented by the chairman, Dr. Opatrnz, and Messrs. Haitman and Jedlicka, vice-chairman and general manager respectively of the Prague Gas Department, and the latter by the chairman, Mr. J. Bartl.

In discussing the development of the gas industry in Poland during the year, Mr. Rabczewski said that in a year of world depression the gas production had declined no more than 1·9 p.ct. Some undertakings, indeed, have experienced an increase in gas output.

The following summarizes some of the papers which were given, dealing with the gas industry.

Street Lighting in Warsaw.

Mr. Cz. Swierczewski discussed the comparative cost of gas and electrical street lighting in Warsaw. He showed:

(1) That the cost of gas illumination is in no case greater, but generally cheaper, than the electrical at prices ruling in Warsaw.

(2) That the regulation of gas illumination, particularly by the use of the pressure wave, is more convenient than that of electrical illumination.

(3) That the character of gas lighting, particularly because of the greater illuminating surface of the several units as compared with the intense light of the incandescent wire, is more diffused than its competitor.

(4) That, whereas the illuminating power of the electric lamp decreases continuously during its life of about 700 hours by about 40 p.ct., and often more, that of the gas mantle increases to a maximum after several days of life, and does not thereafter decrease more than 20 p.ct.

(5) The modern gas lamp may be regarded as practically wind-proof.

(6) The position of gas lamp standards presents no greater impediment to traffic than that of electric standards.

(7) In conclusion, Mr. Swierczewski maintained that the two illuminants should be used side by side, with a view to obtaining a fair comparison with actual practice and without prejudice.

Mr. I. Banaszek discussed another aspect of the same problem, and gave detailed calculations to show the advantage of gas over electricity for this service on a cost basis. He protested against the great cost of changing from gas to electricity, and repeated the challenge that the two should be developed side by side until the case is definitely proved.

Mr. J. Konopka, on the same subject, submitted a detailed calculation of several gas lamp systems, and showed that the higher candle powers are always the cheapest for street illumination.

Periodical Checking of Gas Meters.

Messrs. M. Seifert and S. Skorski discussed proposals that the Board of Weights and Measures should be entrusted with the periodical checking of gas meters after some years of use. Both writers pointed out that this would be an unjustifiable expenditure of public money, and that, inasmuch as the errors due to wear of meters were invariably against the gas undertakings, the latter could be safely left to see that meters were renewed when necessary.

Mr. A. Dziurzynski submitted a close and detailed analysis of four systems of carbonization, with particular reference to the practice at the Poznan works.

Mr. B. Klimczak gave a survey of several of the gas-works, particularly in Western Poland. Of the 33 works reviewed, he found that 7 are managed very well, 13 well, 5 not sufficiently well, and 8 not at all well. The main difficulty is the lack of suitably trained workmen and foremen. The government is endeavouring to meet this want by the establishment at the Industrial School of Bydgoszoz of a gas industry department, in which foremen will be trained for a period of four years. The author proposed to establish technical consultation offices in the several provinces, which would give technical advice, check the operation of plants, control developments, and advise upon projects.

Mr. P. Kowalew described the gas-works at Wilno, which is stated to be the only gas-works in Europe which carbonizes wood. It was built in 1863 by a private company, and the necessity for making gas from wood arises from its great distance from the coal mines. There are four settings of horizontal retorts, and the gas production is about 700,000 c.m. (25 million c.ft.) per annum. The by-products, charcoal and vinegar, are marketed in the neighbourhood.

One of the most interesting of the papers submitted was a heat balance of the carbonizing plant at Warsaw on the Glover-West system, which was described in the "Journal" last year.* This paper was prepared by Mr. J. Malecki. The data, calculations and heat balances are summarized in some detail in the following.

HEAT BALANCE OF THE CONTINUOUS VERTICAL RETORTS AT WARSAW.

By J. Malecki.

Every care was taken to ensure accurate measurements of all the experimental data. All instruments, such as gas and water meters, thermometers, and pyrometers, were controlled and corrected as and when necessary. All observations were made twice, first to ascertain the length of time required to make the tests, and, secondly, specifically for the calculations of the heat balances. These calculations are based on a time period of 8 hours, being repeated three times to obtain four averages. The total number of observations made specifically for the calculations was about 650.

* "Journal," Vol. 195, pp. 370-376, Wola Gas-Works, Warsaw.

The results are shown diagrammatically in the figure. The preparation of the Heat Balances was supervised by Prof. Cz. Grabowski.

EXPERIMENTAL DATA.

Column (1)—Data of test on 16/4/31, 6 a.m. to 2 p.m.
,, (2)— ,, ,, 22/4/31, ,, ,,
,, (3)— ,, ,, 29/4/31, ,, ,,
,, (4)—Average of above.

In each of the columns (1), (2), and (3) the figure given is itself an average of a number of observations.

Item No.	—	Column No. 1.	2.	3.	4.
1	Temp. of primary air . °C.	14·25	21·0	21·5	18·9
2	Temp. of secondary air . ,,	31·5	39·5	48·0	39·6
3	Temp. of coal in the feed hopper . . . . . ,,	15·0	19·0	29·0	21·0
4	Temp. of outside air . . ,,	4·5	8·25	12·75	8·5
5	Temp. of coke to the producer . . . . . ,,	36·0	35·4	52·6	41·4
6	Temp. of coke from the retorts . . . . . ,,	102·5	105·0	100·0	102·5
7	Temp. of clinker from the producers . . . . . ,,	73·0	64·2	59·3	65·5
8	Temp. of steam to the retorts . . . . . ,,	119·05	119·3	119·75	119·4
9	Temp. of superheated steam ,,	210	230	245	228·3
10	Temp. of feed water before preheater . . . . . ,,	21·5	25·5	30	25·67
11	Temp. of feed water after preheater . . . . . ,,	71·0	74·0	79·66	74·89
12	Temp. of producer cooling water . . . . . ,,	8·6	11·25	11·25	10·3
13	Temp. of producer gas—				
	Prods. 1, 2, 3, 4, and 6 . .	623	637·6	610·8	623·8
	Prod. No. 5 . . . . . ,,	625	640	620	628·3
	Prods. 1, 2, 3, 4, 5, and 6 . ,,	623·3	636	612·3	623·9
14	Temp. of waste gas at settings outlet—				
	Settings 1, 2, 3, 4, and 6 ,,	994	968·5	956·2	972·9
	Setting No. 5	980·0	987·3	987·5	984·9
15	Temp. of air near chimney flues . . . . . ,,	30	35	35	33·3
16	Temp. of waste gas leaving boiler . . . . . ,,	230	232·5	231	231·17
17	Temp. of coal gas in foul main . . . . . ,,	137	146	155	146
18	Temp. of waste gas before boiler . . . . . ,,	820	820	820	820
19	Temp. of coal gas before and after meter (average) . . ,,	14·5	16	18·5	16·33
20	Amount of coal in kg.	67,240	67,340	66,500	67,026·6
21	Amount of coke from retorts in kg.	40,750	40,090	40,970	40,603·3
22	Amount of clinker from all 6 producers in kg.	1,595·4	1,666·8	1,409·5	1,557·2
23	Amount of steam to retorts (average) in kg.	..	..	..	15,275
24	Amount of coal gas, 0° C., 760 mm. dry in m^3 . . .	42,467·1	43,259·1	40,662·3	42,129·5
25	Amount of feed water per 8 hrs. in m^3	31·55	28·76	29·00	29·77
26	Amount of cooling water per 8 hrs. in m^3	5·89	6·47	7·49	6·616
27	Amount of producer coke in kg.	8,133·3	8,133·3	8,336·6	8,201·1
	Composition of producer gas by volume (average of observations)—				
28	From producer No. 5: CO_2, 7·49 p.ct.; CO, 25·68 p.ct.; O_2, 0; H_2, 11·78 p.ct.; CH_4, 0·75 p.ct.; N_2, 54·30 p.ct.				
29	From producers 1, 2, 3, 4, and 6: CO_2, 8·51 p.ct.; CO, 23·24 p.ct.; O_2, 0; H_2, 9·57 p.ct.; CH_4, 1·01 p.ct.; N_2, 57·67 p.ct.				
30	Composition of coal gas by volume (average of observations)— CO_2, 5·00 p.ct; CO, 19·45 p.ct.; H_2, 52·00 p.ct.; CH_4, 14·3 p.ct.; O_2, 1·4 p.ct; N_2, 5·85 p.ct.; C_nH_m, 2·00 p.ct				
	Composition of waste gases at settings outlet by volume (average of observations)—				
31	Settings 1, 2, 3, 4, and 6: CO_2, 18·08 p.ct.; O_2, 2·19 p.ct.; N_2, 79·73 p.ct.				
32	Setting No. 5: CO_2, 18·93 p.ct.; O_2, 1·3 p.ct.: N_2, 79·77 p.ct.				
33	Composition of waste gases after boiler by volume (average of observations)— CO_2, 15·44 p.ct.; O_2, 5·03 p.ct.; N_2, 79·53 p.ct.				
34	Composition of coal by weight (average of observations)— Moisture, 2·25 p.ct.; Ash, 4·83 p.ct.; C, 78·03 p.ct.: H, 4·90 p.ct; S, 0·43 p.ct.; O + N, 9·56 p.ct.				
35	Composition of coke from retorts by weight (average of observations)— Moisture, 1·49 p.ct.; Ash, 11·51 p.ct.; C, 84·84 p.ct.; H, 0·87 p.ct.; S, 0·28 p.ct; O + N, 1·01 p.ct.				
36	Composition of coke to producers by weight (average of observations)— Moisture, 1·08 p.ct.; Ash, 11·5 p.ct.; C, 85·2 p.ct.; H, 1·04 p.ct.; O, 0·23 p.ct.; N, 0·67 p.ct.; S, 0·28 p.ct.				
37	Percentage of coke in cinders to amount of clinker (wet) by weight	34·4	31·6	35·6	33·87
38	Grammes of steam in 1 m^3 of foul coal gas	..	262·3	266·3	264·3
39	Atmospheric pressure in mm. of Hg.	752·1	743·3	748·5	748
40	Absolute pressure of steam to retorts in atmos.	1·96	1·985	2·01	1·985
41	Absolute pressure of steam in boiler in atmos.	8·5	8·5	8·313	8·438
42	Pressure of coal gas in meter in mm. of H_2O.	370	366	340	358·7
43	Calorific value of coal gas, kg.-cals./m^3, 0° C., 760 mm., dry	3,990	4,000	4,020	4,003·3
44	Cal. value of coal (bomb calorimeter), kg./cal./kg. . . .	..	..	..	7,523·8
45	Cal. value of tar (bomb calorimeter), kg./cal./kg . . .	..	..	..	8,625
46	Yield of dry tar, gas-works' reports, April to November, 1931, kg./100 kg. coal . .	..	..	..	7·52
47	Yield of ammonia from report, gr./100 m^3	..	..	..	629·26
48	Benzol in coal gas (average), gr./100 m^3	..	..	..	1,600
49	Hydrogen sulphide in coal gas, p.ct. of volume.	..	..	..	1
50	Decomposed steam in producers, from preliminary tests, p.ct.	..	..	..	55·15
51	Humidity of air (outside), p.ct.	81	80	77	79·3

Heat Balance of Producers.

INPUT TO PRODUCERS.

Coke—
Gross calorific value calculated from composition by Dulong formula = 7177·2 cal./kg.
∴ Total heat value of coke = 8201 × 7177·2 = 58,860,217 cal.
Weight of dry coke = 8201·1 − (8201·1 × 0·0108) = 8201·1 − 88·57 = 8112·53 kg.
Specific heat according to Debrunner = 0·193.
∴ Sensible heat of dry coke = 8112·53 × 41·4 × 0·193 = 64,821 cal.

And sensible heat of moisture in coke = 88·57 × 41·4 = 3,667 cal.

Water—
Sensible heat of cooling water = 6616 × 10·3 = 68,145 cal.

Primary air (dry)—
From coke used and composition of producer gas for producers 1, 2, 3, 4, and 6—
Producer gas generated. . . . . = 31,033·6 m^3
Primary air introduced (dry) . . . . . = 22,654·5 m^3
Specific heat of dry air . . . . . = 0·313 cal./m^3
Sensible heat of primary air (dry) to producers 1, 2, 3, 4, and 6 = 22,654·5 × 18·9 × 0·313 = 134,017 cal.
Similarly to above for producer No. 5—
Producer gas generated. . . . . = 5995·6 m^3
Primary air introduced (dry) . . . . . = 4120·8 m^3
Sensible heat of primary air (dry) to producer No. 5 = 4120·8 × 18·9 × 0·313 = 24,377 cal.
Total sensible heat of dry primary air = 134,017 + 24,377 = 158,394 cal.

Moisture in primary air—
1 m^3 of dry air at 0° C becomes 1·043 m^3 of sat. air at 8·5° C. and weight of moisture per 1 m^3 = 0·00846 kg. Total heat of moisture at 18·9° C. = 603·7 cal./kg.
Then, total heat of moisture in primary air—
For producers 1, 2, 3, 4, and 6 = 22,654·5 × 0·00846 × 0·793 × 1·043 × 603·7 . . . . . = 95,699 cal.
For producer No. 5 = 4120·8 × 0·00846 × 0·793 × 1·043 × 603·7. . . . . = 17,387 cal.
∴ Total heat of moisture in primary air . . = 113,086 cal.

TOTAL AMOUNT OF HEAT PUT INTO PRODUCERS = 59,268,330 cal.

OUTPUT OF PRODUCERS.

Heat value of producer gas—
From composition of producer gas, calorific value of gas for producers 1, 2, 3, 4, and 6 = 1093·4 cal./m^3, and for producer No. 5 = 1210·1 cal./m^3.
Heat value—
For producers 1, 2, 3, 4, and 6 = 31,033·6 × 1093·4 = 33,932,138 cal.
For producer No. 5 = 5,995·6 × 1210·1 = 7,255,276 cal.
Total . . . . . = 41,187,414 cal.

Sensible heat of dry producer gas—
Calculated from composition, specific heat of gas for producers 1, 2, 3, 4, and 6 = 0·3400 cal./m^3, and for producer No. 5 = 0·3377 cal./m^3.
Sensible heat—
For producers 1, 2, 3, 4, and 6 = 31,033·6 × 0·3400 × 623·8 . . . . . = 6,581,978 cal.
For producer No. 5 = 5995·6 × 0·3377 × 628·3 . = 1,272,348 cal.
Total . . . . . = 7,854,326 cal.

Total heat of moisture in producer gas—
Undecomposed steam in producer gas calculated from cooling water, coke, primary air, clinker, and p.ct. decomposed = 2974 kg.
Total heat of steam at temperature 623·9° C. = 888·85 cal./kg.
Total heat of moisture in producer gas = 2974 × 888·85 = 2,643,440 cal.

Heat of combustion of coke in clinker—
Weight of coke in clinker = 1557·2 × 0·3387 = 527·4 kg.
Heat of combustion = 527·4 × 7177·2 = 3,785,255 cal.

Sensible heat of dry clinker—
Weight = 1557·2 − 261 = 1296·2 kg.
Sensible heat = 1296·2 × 0·2 × 65·5 = 16,980 cal.

Sensible heat of moisture in clinker—
Sensible heat = 261·0 × 65·5 = 17,095 cal.

Radiation, convection, and calculation errors = 3,763,820 cal.

TOTAL AMOUNT OF HEAT OUTPUT FROM PRODUCERS = 59,268,330 cal.

Summary of Heat Balance for Producers.

PRODUCER INPUT.

—	Kg.Cal.	P.Ct.
1. Total heat value of coke	58,860,217	99·33
2. Sensible heat of dry coke	64,821	0·11
3. ,, ,, moisture in coke	3,667	0·01
4. ,, ,, the cooling water	68,145	0·11
5. ,, ,, the dry primary air	158,394	0·26
6. Total heat of moisture in ,, ,,	113,086	0·18
	59,268,330	100·00

PRODUCER OUTPUT.

—	Kg.Cal.	P.Ct.
1. Heat value of producer gas	41,187,414	69·50
2. Sensible heat of dry producer gas	7,854,326	13·25
3. Total heat of moisture in gas	2,643,440	4·45
4. Heat of combustion of coke in clinker	3,785,255	6·39
5. Sensible heat of dry clinker	16,980	0·03
6. ,, ,, moisture in clinker	17,095	0·03
7. Radiation, convection, and calculation errors	3 763,820	6·35
	59,268,330	100·00

Heat Balance of Retorts.

INPUT TO SETTINGS.

Coal—

Gross calorific value calculated from composition by Dulong formula = 7405·6 cal./kg.

Therefore, total heat value of coal = 67,026·6 × 7405·6 = 496,372,189 cal.

Weight of dry coal = 67,026·6 − (67,026·6 × 0·0225) = 67,026·6 − 1508·1 = 65,518·5 kg.

Sensible heat = 65,518·5 × 0·2 × 21·0 = 275,177 cal.

And sensible heat of moisture in coal = 1508·1 × 21 = 31,670 cal.

Producer gas—

From calculations for producer—

Heat value of producer gas (dry) = 41,187,414 cal.

Sensible heat of dry gas = 7,854,326 cal.

Total heat of moisture in the gas = 2,643,440 cal.

Steam to retorts—

Total heat of steam = 646·8 cal./kg.

Total heat of steam to the retorts = 15,275 × 646·8 = 9,879,870 cal.

Secondary air (dry)—

From the composition of the producer gas and waste gas, the secondary air introduced into settings was calculated—

For settings 1, 2, 3, 4, and 6 = 32,951·5 m³ (dry)

For setting No. 5 = 6,405·1 m³ (dry)

Sensible heat of dry secondary air—

For settings 1, 2, 3, 4, and 6 = 32,951·5 × 39·6 × 0·313 = 408,427 cal.

For setting No. 5 = 6,405·1 × 39·6 × 0·313 = 79,390 cal.

Total = 487,817 cal.

Moisture in secondary air—

1 m³ of dry air at 0° C. becomes 1·043 m³ of sat. air at 8·5° C. and weight of moisture per 1 m³ = 0·00846 kg.

Total heat of moisture at 39·6° C. = 613·5 cal./kg.

Then total heat of moisture in secondary air—

For settings 1, 2, 3, 4, and 6 = 32,951·5 × 0·00846 × 0·793 × 1·043 × 613·5 = 141,449 cal.

For setting No. 5 = 6405·1 × 0·00846 × 0·793 × 1·043 × 613·5 = 27,491 cal.

Therefore total heat of moisture in secondary air = 168,940 cal.

TOTAL AMOUNT OF HEAT INPUT TO THE RETORTS = 558,900,843 cal.

OUTPUT FROM SETTINGS.

Coke—

Gross calorific value calculated from composition by Dulong formula = 7,094·73 cal./kg.

∴ Total heat value of coke = 40,603·3 × 7094·73 = 288,069,451 cal.

Weight of dry coke = 40,603·3 − (40,603·3 × 0·0149) = 40,603·3 − 605·0 = 39,998·3 kg.

Sensible heat = 39,998·3 × 0·193 × 102·5 = 791,266 cal.

Total heat of moisture in coke (640·2 cal./kg.) = 605 × 640·2 = 387,321 cal.

Coal gas (purified)—

Heat value = 42,129·5 × 4003·3 = 168,657,027 cal.

Specific heat of gas by calculation from composition = 0·3501 cal./m³

Sensible heat of dry coal gas = 0·3411 × 42,129·5 × 146 = 2,153,433 cal.

Tar—

Tar produced in 8 hours work = 670·26 × 7·52 = 5040·3 kg.

Heat value = 5040·3 × 8625·0 = 43,472,587 cal.

Sensible heat = 5040·3 × 146 × 0·45 = 331,148 cal.

Undecomposed steam in raw coal gas—

Total heat of steam at 146° C. = 660·8 cal./kg.

Total heat of undecomposed steam = 42,129·5 × 0·2643 × 660·8 = 7,358,000 cal.

Ammonia and sulphuretted hydrogen in the foul gas—

Amount of H_2S = 421·29 m³. Gross cal. value = 6014 cal./m³

Heat value of H_2S = 421·29 × 6014 = 2,533,638 cal.

Sensible heat of H_2S = 421·29 × 0·375 × 146 = 23,066 cal.

Amount of NH_3 = 421·29 × 0·62926 = 265·1 kg. Gross cal. value = 5468 cal./kg.

Heat value of NH_3 = 265·1 × 5468 = 1,449,567 cal.

Sensible heat of NH_3 = 265·1 × ·536 × 146 = 20,746 cal.

Waste gases—

From the composition of the producer gas and waste gas the amount of dry waste gases was calculated—

For settings 1, 2, 3, 4, and 6 = 55,298·8 m³

For setting No. 5 = 10,499·5 m³

Specific heat of dry waste gases, calculated from composition, for settings 1, 2, 3, 4, and 6 = 0·3631 cal./m³ and for setting No. 5 = 0·3656 cal./m³

Sensible heat of dry waste gases—

For settings 1, 2, 3, 4, and 6 = 55,298·8 × 0·3631 × 972·9 = 19,534,849 cal.

For setting No. 5 = 10,499·5 × 0·3656 × 984·9 = 3,780,657 cal.

Total = 23,315,506 cal.

Moisture in waste gases for settings 1, 2, 3, 4, and 6—

In producer gas = $\frac{3}{8}$ × 2974 = 2478·3 kg.

From combustion of dry producer gas (calculated from composition) = 2888·2 kg.

In secondary air = 227·92 kg.

Total = 5594·42 kg.

Moisture in waste gases for setting No. 5

In producer gas = $\frac{1}{8}$ × 2974 = 495·7 kg.

From combustion of dry producer gas (calculated from composition) = 639·35 kg.

In secondary air = 44·3 kg.

Total = 1179·35 kg.

Total heat of steam at 972·9° C. = 1069·6 cal./kg.

Total heat of steam at 984·9° C. = 1076·4 cal./kg.

Total heat of moisture in waste gases—

For settings 1, 2, 3, 4, and 6 = 5594·42 × 1069·6 = 5,983,792 cal.

For setting No. 5 = 1179·35 × 1076·4 = 1,269,452 cal.

Total = 7,253,244 cal.

Radiation, convection, and calculation errors = 13,084,843 cal.

TOTAL AMOUNT OF HEAT OUTPUT FROM RETORTS = 558,900,843 cal.

Summary of Heat Balance for Retorts.

INPUT TO SETTINGS.

—	Cal.	P.Ct.
1. Heat value of coal	496,372,189	88·81
2. Sensible heat of the dry coal	275,177	0·049
3. ,, ,, moisture in the coal	31,670	0·006
4. Heat value of the dry producer gas	41,187,414	7·37
5. Sensible heat of ,, ,, ,,	7,854,326	1·41
6. Total ,, moisture in producer gas	2,643,440	0·47
7. ,, ,, steam to retorts	9,879,870	1·768
8. Sensible ,, dry secondary air	487,817	0·087
9. Total ,, moisture in secondary air	168,940	0·03
	558,900,843	100·000

OUTPUT FROM SETTINGS.

—	Cal.	P.Ct.
1. Heat value of coke	288,069,451	51·54
2. Sensible heat of dry coke	791,266	0·14
3. Total ,, moisture in coke	387,321	0·069
4. Heat value of coal gas	168,657,027	30·18
5. Sensible heat of dry coal gas	2,153,433	0·385
6. Heat value of tar	43,472,587	7·78
7. Sensible heat of dry tar	331,148	0·059
8. Total heat of undecomposed steam in raw coal gas	7,358,000	1·32
9. Heat value of sulphuretted hydrogen	2,533,638	0·45
10. Sensible heat of ,, ,,	23,066	0·004
11. Heat value of ammonia	1,449,567	0·259
12. Sensible heat ,,	20,746	0·004
13. ,, ,, of dry waste gases	23,315,506	4·17
14. Total heat of moisture in waste gases	7,253,244	1·30
15. Radiation, convection, and calculation errors	13,084,843	2·34
	558,900,843	100·000

Heat Balance of the Waste Heat Boiler.

INPUT TO BOILER.

Waste gases—
Sensible heat of dry waste gases as previously calculated . . . . . = 23,315,506 cal.
Total heat of moisture in waste gases as previously calculated . . . . . = 7,253,244 cal.

The leakage air (dry)—
The amount of dry leakage air calculated from composition of gas after boiler—
For settings 1, 2, 3, 4, and 6. . . . . = 9856·3 m³
For setting No. 5 . . . . . = 2450·4 m³
Sensible heat of dry leakage air—
For settings 1, 2, 3, 4, and 6 = 9856·3 × 33·3 × 0·313 = 102,731 cal.
For setting No. 5 = 2450·4 × 33·3 × 0·313 . . . = 25,540 cal.
Total . . . . . = 128,271 cal.

Moisture in leakage air—
1 m³ of dry air at 0° C. becomes 1·043 m³ of sat. air at 8·5° C. and weight of moisture per 1 m³ = 0·00846 kg.
Total heat of moisture at 33·3° C. = 610·4 cal./kg.
Then total heat of moisture in leakage air—
For settings 1, 2, 3, 4, and 6 = 9856·3 × 0·00846 × 0·793 × 1·043 × 610·4 . . . . . = 42,099 cal.
For setting No. 5 = 2450·4 × 0·00846 × 0·793 × 1·043 × 610·4 . . . . . = 10,468 cal.
Total . . . . . = 52,567 cal.

Feed water—
Sensible heat of feed water before preheater = 29,770 × 25·67 = 764,196 cal.

Heat used in preheating water from 25·67° C. to 74·89° C. = 29,770 × (74·89 − 25·67) = 1,465,279 cal.

TOTAL AMOUNT OF HEAT INPUT TO BOILER = 32,979,063 cal.

OUTPUT FROM BOILER.

Steam—
Pressure = 8·438 atmos. = 8·72 kg./cm². Saturation temp. = 173·14° C.
Total heat of saturation = 664·31 cal./kg
Total heat of saturated steam from boiler = 29,770 × 664·31 = 19,776,509 cal.

Heat used to superheat steam to temp. of 228·3° C. = 29,770 × (228·3 − 173·14) × 0·5537 = 909,238 cal.

Waste gases—
Specific heat of dry waste gases leaving boiler, calculated from composition = 0·3345 cal./m³.
Sensible heat of dry waste gases—
For settings 1, 2, 3, 4, and 6 = (55,298·8 + 9856·3) × 0·3345 × 231·17 . . . . . = 5,038,207 cal.
For setting No. 5 = (10,499·5 + 2450·4) × 0·3345 × 231·17 . . . . . = 1,001,368 cal.
Total . . . . . = 6,039,575 cal.

Amount of steam in waste gases—
For settings 1, 2, 3, 4, and 6 = 5594·4 + 69·0 = 5663·4 kg.
For setting No. 5 = 1179·4 + 17·2 = 1196·6 kg.
Total heat of steam at 231·17° C. = 700·4 cal./kg.
Total heat of moisture in waste gases—
For settings 1, 2, 3, 4, and 6 = 5663·4 × 700·4 . = 3,966,445 cal.
For setting No. 5 = 1196·6 × 700·4 . = 838,099 cal.
Total . . . . . = 4,804,544 cal.

Radiation, convection, and calculation errors . . . = 1,449,197 cal.

TOTAL AMOUNT OF HEAT OUTPUT FROM BOILER = 32,979,063 cal.

Summary of Heat Balance for the Waste-Heat Boiler.

INPUT TO BOILER.

—	Cal.	P.Ct.
1. Sensible heat of dry waste gases	23,315,506	70·70
2. Total heat of moisture in waste gases . . .	7,253,244	21·99
3. Sensible heat of dry leakage air	128,271	0·39
4. Total heat of moisture in leakage air . . .	52,567	0·16
5. Sensible heat of feed water	764,196	2·32
6. Heat used to preheat feed water	1,465,279	4·44
Total	32,979,063	100·00

OUTPUT FROM BOILER.

—	Cal.	P.Ct.
1. Total saturation heat of steam	19,776,509	59·97
2. Superheat of steam	909,238	2·76
3. Sensible heat of dry waste gases	6,039,575	18·31
4. Total heat of moisture in waste gases . . .	4,804,544	14·57
5. Radiation, convection, and calculation errors	1,449,197	4·39
Total	32,979,063	100·00

The conclusions drawn from the heat balances are as follows:

(1) The efficiency of the producers, which are of the standard, Glover-West, open step-grate type, operated at atmospheric pressure and using "run-of-retort" coke, is calculated to be 75 p.ct.

(2) The efficiency of the carbonization process as a whole, expressed as a ratio of the total calorific value of the coke and gas and total heat of surplus steam less the net calorific value of the producer fuel, to the total calorific value of the coal supplied, together with the total heat of the steam returned to the system, was calculated to be 81·5 p.ct.

(3) The efficiency of the waste-heat boiler, expressed as the ratio of the total heat of the steam obtained to that of the waste gases supplied to the boiler, was found to be 62·7 p.ct.

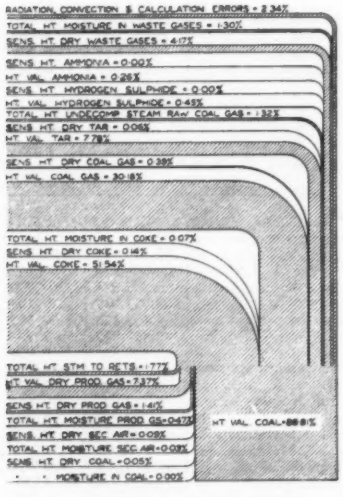
(4) Comparisons were made between this and several other published heat balances. Those most relevant are comparisons with the installation of similar retorts at Stamford, Conn., U.S.A., and that at Brno, Czechoslovakia.

(5) Heat and material balances of the installation at Stamford were published in the Proceedings of the American Gas Association (1927) Convention, and were drawn up under the direction of Prof. J. T. Ward, of the Massachusetts Institute of Technology.

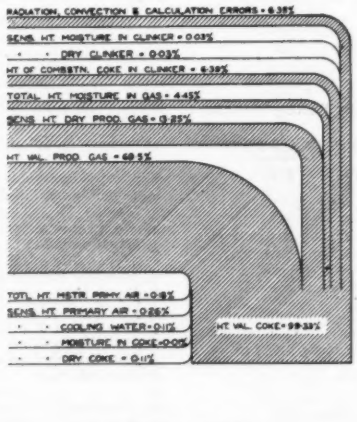
Gas is made at Stamford at a much higher calorific value—viz., 530 B.Th.U. = 5060 kg.-cal. as compared with about 4000 at Warsaw.

The radiation and convection losses at Stamford were 3·99 p.ct., as against only 2·63 p.ct. at Warsaw, on the total calorific value of the coal carbonized.

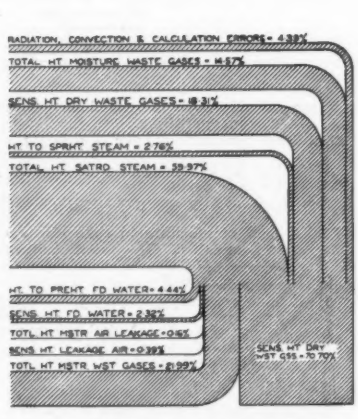
The addition of a third circulating chamber in the setting at the top of the retorts at Warsaw resulted in a drop in the heat carried away by flue gases


RADIATION, CONVECTION & CALCULATION ERRORS = 2.34%
TOTAL HT MOISTURE IN WASTE GASES = 1.30%
SENS. HT DRY WASTE GASES = 4.17%
SENS HT AMMONIA = 0.00%
HT VAL AMMONIA = 0.26%
SENS HT HYDROGEN SULPHIDE = 0.00%
HT VAL HYDROGEN SULPHIDE = 0.45%
TOTAL HT LOSSCOMP STEAM RAW COAL GAS = 1.32%
SENS HT DRY TAR = 0.06%
HT VAL TAR = 7.78%
SENS HT DRY COAL GAS = 0.38%
HT VAL COAL GAS = 30.18%
TOTAL HT MOISTURE IN COKE = 0.07%
SENS HT DRY COKE = 0.14%
HT VAL COKE = 51.54%
TOTAL HT STM TO BETS = 1.77%
HT VAL DRY PROD GAS = 7.47%
SENS HT DRY PROD GAS = 1.41%
TOTAL HT MOISTURE PROD GS = 0.47%
SENS HT DRY SEC AIR = 0.08%
TOTAL HT MOISTURE SEC AIR = 0.03%
SENS HT DRY COAL = 0.05%
MOISTURE IN COAL = 0.90%
HT VAL COAL = 88.81%

1. RETORTS.


RADIATION, CONVECTION & CALCULATION ERRORS = 6.38%
SENS HT MOISTURE IN CLINKER = 0.03%
DRY CLINKER = 0.03%
HT OF COMBSTN. COKE IN CLINKER = 6.38%
TOTAL HT MOISTURE IN GAS = 4.45%
SENS HT DRY PROD GAS = 13.85%
HT VAL PROD GAS = 69.5%
TOTL HT MSTR PRMY AIR = 0.8%
SENS HT PRIMARY AIR = 0.26%
COOLING WATER = 0.11%
MOISTURE IN COKE = 0.05%
DRY COKE = 0.11%
HT VAL. COKE = 99.33%

2. PRODUCERS.


RADIATION, CONVECTION & CALCULATION ERRORS = 4.39%
TOTAL HT MOISTURE WASTE GASES = 14.57%
SENS HT DRY WASTE GASES = 18.31%
HT TO SPRHT STEAM = 2.76%
TOTAL HT SATRD STEAM = 59.97%
HT TO PREHT FD WATER = 4.44%
SENS HT FD WATER = 2.32%
TOTL HT MSTR AIR LEAKAGE = 0.6%
SENS HT LEAKAGE AIR = 0.39%
TOTL HT MSTR WST GASES = 21.99%
SENS HT DRY WST GAS = 16.70%

3. WASTE-HEAT BOILER.

HEAT BALANCE DIAGRAMS.

from 8·03 at Stamford to 6·16 at Warsaw, again p.ct. of the total calorific value of the coal carbonized.

These and other constructional developments resulted in the important reduction in the total heat supplied to the producer necessary to carbonize 1 kg. of coal from 1042·0 kg.-cal. at Stamford to 884·3 kg.-cal. at Warsaw, no allowance being made for the losses in the clinker, and without subtracting the heat in the surplus steam from the waste-heat boiler.

(6) The heat balances of the plant at Brno were prepared by Dr. F. Perna and published in the "Plyn a Voda," 1930, pp. 131-136. A full description of the plant and the principal results were published in the "JOURNAL" of April 16 and 23, 1930, pp. 152 and 195.

Gas was made at a calorific value of 4975 kg.-cal. per c.m. The total calorific value of gas made per 100 kg. of coal at Brno was 41·12 × 4975 = 204,570 kg.-cal. = 82·48 therms per ton, as against 62·85 × 4000 = 252,000 kg.-cal. at Warsaw = 101·6 therms per ton.

The fuel consumption in the producer at Warsaw was 12·23 gross and 11·43 net, as against 14·00 gross and 12·57 net at Brno, all expressed as p.ct. by weight of coal carbonized.

The total calorific value of the coke supplied to the producers for the carbonization of 1 kg. of coal was 599 kg.-cal. at Brno, as against 512·9 kg.-cal. at Warsaw after deducting that of the coke recovered from the producers and the heat available in the steam raised in the waste-heat boiler.

(7) Comparing the composition of the producer gas in the Warsaw installation with that in other installations, it is clear that the adjustments of the producers were not satisfactory during the periods of the tests. The poor quality of the producer gas is thought to be due to the excessive cooling water supplied to the plates of the producer. This amounts to 0·807 kg. of water per kg. of coke supplied to the producer, as against the normal 0·2 to 0·5. This excess of cooling water gives rise to much undecomposed steam passing forward to the setting, which is so much unnecessary ballast increasing the chimney losses and affecting the efficiency of the waste-heat boiler.

On the other hand, the very low fuel account indicates that the heat efficiency of the setting is very good, since even with this very poor producer gas the results are excellent.

(8) Generally, it is claimed that the Glover-West system comes out of the investigation as a very good example of setting and retort design, and that the standard of operation of the plant at Warsaw is very high.

IN CONTINENTAL COUNTRIES - - -

Abstract Translations from the Technical Press of France and Germany

PURIFICATION AT NANTERRE.

The oxide purification system in use at Nanterre is described in the "Journal des Usines à Gaz," 1932, 56, 410-413 (Aug. 5).

The Klönne system in use at Recklinghausen was adopted, since it enables ground space and labour costs to be much reduced. Ground space is reduced owing to the fact that 7 superimposed layers of oxide are employed in the boxes. Fouling is complete, and revivification occurs in the boxes during a single period of working.

Each of the four purifiers has an area of 26·2 ft. by 26·2 ft. and is 14·2 ft. high. The purifiers are of sheet steel, and each is separate from the other. The metal plates are covered with a protective coating, and the bottoms are covered with a layer of concrete. The covers are sealed by means of rubber joints. Each purifier has two dismountable pipes by means of which the oxide may be discharged. Isolation is effected by hydraulic syphons. The oxide in each purifier is divided into 7 layers, 18 in. thick, resting on rectangular hurdles. Vertical passages divide the gas into several streams, some of which pass through the oxide in a downward direction and others in an upward direction. The direction of flow inside each purifier can be reversed. Suitable connections are provided to enable backward rotation to be applied.

Each purifier is provided with a condensate drain pipe and a steam pipe, and each purifier holds 200 tons of oxide consisting of 50 p.ct. lux mass, 25 p.ct. limonite, and 25 p.ct. used oxide. Later experience showed that a preferable composition is 30 p.ct. lux mass, 50 p.ct. limonite, and 20 p.ct. used oxide. A system of manometers indicates the back pressure in the purifiers, and a compressor with a recording flow meter supplies a controllable amount of air to the gas at the inlet to the purifiers. Admission of air should be continuous and in amount proportional to the sulphuretted hydrogen content of the gas. Strict control of the oxygen content of the purified gas is essential; but traces should be present. The amount of air added is approximately 2½ p.ct.

Daily readings of the thermometers at the inlet and outlet of each purifier are taken. The temperature should not exceed 86-95° Fahr. Careful control is also exercised over the back-pressure of the purifiers.

Admission of steam is discontinuous, and steam is supplied only to the purifiers in the first two positions. After the purifiers had been charged, no steam was necessary for the first two weeks. From then onwards, steam at 3 lbs. pressure was supplied to the first two boxes for one hour every two days. After three months, steam was admitted for 1-2 hours every day with due regard to the fact that too much steam causes the purifiers to heat up and increases the back pressure. The total pressure drop in the four purifiers is 2½ in.-6 in. W.G. according as the daily make varies from 3 million to 4½ million c.ft.

With the purifiers working, at the outset, in the order 1-2-3-4, purification and revivification at first occur simultaneously in the first purifier; but, as times goes on, the reactions cease to be complete, and the second purifier comes into play. When the third purifier commences to pass sulphuretted hydrogen, the order is changed to 4-1-2-3. Purifier 4, which is in the fresh condition, then quantitatively removes the sulphuretted hydrogen while purifier 1 revivifies. After three days, the order is changed to 3-4-1-2, after another three days to 2-3-4-1, and finally back to 1-2-3-4. This latter order is maintained until purifier 3 again commences to pass sulphuretted hydrogen. The cycles are repeated as long as purifier 1 continues to take up sulphur, and when this stage is passed this purifier is discharged and refilled. By this means, a maximum enrichment with sulphur is obtained. Reversal of the direction of flow of gas through the oxide is effected daily.

After a year's operation, samples of oxide removed from the cleaning holes of the purifier covers gave the following results on analysis:

Purifier No.	1	2	3	4
	P.Ct.	P.Ct.	P.Ct.	P.Ct.
Moisture content	24·8	28·0	36·4	41·6
Total sulphur content, dry basis	36·7	31·0	29·0	18·0

Further details of the installation are as follows:

Capacity = 5·6 million c.ft./24 hours
Exposed surface of oxide = 19,300 sq. ft., equivalent to 0·85 sq. ft. per purifier per 1000 c.ft. of gas per 24 hours
Total volume of oxide = 28,500 c.ft., equivalent to 5 c.ft. per 1000 c.ft. of gas per 24 hours
Gas velocity = 10 in. per minute
Contact time = $\frac{4 \times 18}{10}$ = 7·2 minutes

Even after sixteen months' operation, it has not yet been necessary to discharge one of the purifiers.

Expansion of the purifiers can occur freely in all directions without the fear of breakage which is inherent with cast iron construction. Furthermore, complete saturation of the oxide in one operating period obviates the frequent handling and periodical external revivification necessary in the case of ordinary purifiers. Hence corrosion of the steel, castings, and concrete is much diminished, and maintenance costs are low.

THE "JOURNAL" TECHNICAL RECORD

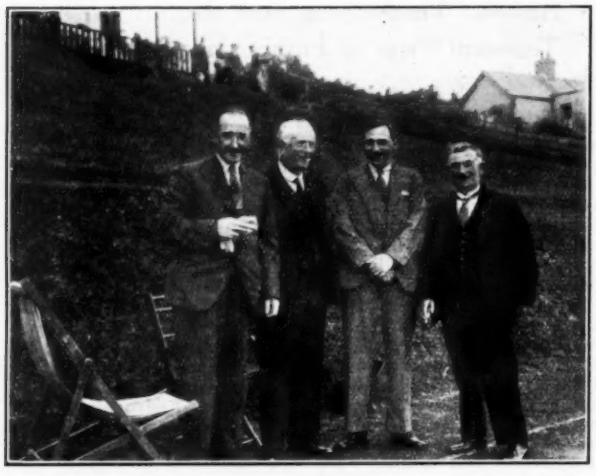
Which contains Reports of Meetings of Gas and Allied Associations

Vertical Retorts for Small Gas Undertakings*

By F. G. M'ELWEE, of Coleraine.

The application of the continuous vertical retort to the requirements of the small gas undertaking is no new thing in the North of Ireland. As long ago as 1911 it was adopted by the Lurgan undertaking at a time when the annual make was no more than 48 millions, and by the Holywood undertaking in 1917 when the make was 29 millions. My own experience of it dates from 1930, when the installation of Glover-West vertical retorts was built at Coleraine, our output for that year being 55 millions.

The horizontal retort plant, which was built in 1906, was originally designed for four beds, each of 6-10 ft. retorts. Two additional beds were added later to meet the increasing demand for gas, but during the winter of 1929 we found it impossible to deal with the demand. For one thing, there was considerable difficulty during the winter



An Irish Association Presidential Group.

The President. On his right, his successor; on his left, his predecessor, with the Secretary.

months, when the six beds were working, in maintaining a sufficient working temperature in the settings owing to the inadequate size of the main flue. True, an improvement could have been made by building a new flue and chimney, but this would have been merely a temporary measure, in view of the rapidly increasing demand for gas, which would very soon have exhausted the limits of the capacity of even the six beds of retorts.

GLOVER-WEST "NEW MODEL" RETORTS.

The vertical retort installation comprises four retorts of the standard Glover-West pattern known as the "New Model"—that is, with the steaming chamber at the base, of a nominal capacity of 80,000 c.ft. per retort per diem. The retort setting is of standard design with two sets of combustion chambers each containing two retorts, and the arrangement is so well known that it need not be described here. There are, however, some refinements which may be touched upon. There is, for instance, an additional damper in the producer gas uptake, which serves to check the flow of gas to the upper producer gas nostrils and so facilitates the distribution of fuel gas among the six combustion chambers or floors which are arranged horizontally across the setting. There is a set of burners on each side of the retorts, and the waste gases rise through the floor tiles within the setting in the usual way. The setting is operated under a minimum of draught. In fact, there is no more than about 1½-tenths of draught in the bottom combustion chambers, which vanishes to level gauge in the top combustion chambers with a slight pressure in the circulating chambers around the tops of the retorts.

Great care is also taken always to maintain a distinct pressure within the retorts themselves. Too much emphasis cannot be laid upon the importance of the latter precaution. A vacuum within the retort causes dilution of the gas made with inerts and gives rise to rapid deterioration of the retort walls with ultimate destruction. A pressure within the retort ensures that any cracks are quickly made up, prevents ingress of furnace gases, and, above all, by keeping the steam in contact with the coke as long as possible, increases the efficiency of steaming, and consequently the make of gas in therms per ton.

PRODUCERS.

Perhaps the most interesting point in the design of this retort bench is the arrangement and proportioning of the producers. It should be explained that provision is made in the brickwork for the future installation of a further unit of two retorts. The producers are designed with this in mind. They are three in number, and the fuel gas from each rises to a common flue. The effect of this is that two of the producers can be in operation for the supply of any four of the retorts, and, even, all six of the retorts when not pushed for gas production.

The proportions of the producers are kept down to the minimum, for in this way the maximum of efficiency, that is the minimum of fuel consumption, is obtained. They are of the step-grate type, open to the atmosphere so that the supply of primary air is determined automatically by the consumption of gas within the setting. There are six free spaces of about 5 in. between the steps in each producer, and each producer is 36 in. wide, so that the maximum net effective grate area of each is 1080 sq. in. This area can be reduced by sealing one or more of the spaces with wet ashes. Under normal conditions each retort will be carbonizing 4½ tons of coal per diem, which is equal to 13½ tons per three retorts. The maximum duty of each producer, therefore, at 15 p.ct. fuel consumption is $3 \times 13\frac{1}{2} = 40\frac{1}{2}$ cwt. per diem, which again is equal to 189 lbs. of coke per hour; so that the maximum net effective grate area is calculated at the rate of 5·7 sq. in. per lb. of coke consumed in the producer per hour.

I am aware that this is a smaller figure than is advocated in some quarters, but I can assure members that these producers have worked very well and very economically since the plant was put into operation.

IMPORTANT DETAILS.

As regards the work done by the Manager himself, however, possibly the most important details are those comparatively small ones, the means of regulating the speed of travel of the charge through the retort and the supply of steam to it, to which may be added the dampers regulating the passage of fuel gases to and away from the setting.

With regard to the first two, nothing can be more convenient than the ratchet-and-mask device, incorporated in this particular design of plant, and the needle valve controlling the supply of steam to each retort. Within quite a large range no other regulation is necessary than these two. It is only when there is a radical departure in the quality of coal, or a distinct reduction in the throughput of the retort is called for, that it becomes necessary to adjust the chimney draught. And these dampers are given easy access by means of a cast-iron door. The individual dampers throughout the setting are, of course, only touched when cleaning the nostrils or when altering the distribution

* Paper read before the Irish Association of Gas Managers, Dublin, Aug. 16.

of the heat through the setting, a thing which, where the plant is properly adjusted, is very seldom done.

The results have been quite up to expectation. Over the last twelve months we have made 62,393,000 c.ft. of gas. For this make we have needed no more than 3664 tons of coal, making 17,030 c.ft. of gas per ton of coal carbonized, which, at the average calorific value of 480 B.Th.U. per c.ft., is equivalent to 81·6 therms.

The labour cost shows a most decided improvement over horizontal retort working. The weekly cost of the horizontal retort house capable of producing 240,000 c.ft. of gas per diem was £38 14s. 9d., whereas with the present plant, with an average capacity of 320,000 c.ft. per diem, the weekly wages cost on a strictly comparable basis is only £13 8s. 8d., the plant being operated comfortably by one man on each of the morning and afternoon shifts, and two on the night shift.

From left to right: Messrs. J. W. M'Lusky, D. H. Munro, W. H. Ainsworth, T. N. Walsh, T. D. Hamilton, and T. C. Hurll.

Flexibility of Operation.

The extraordinary flexibility of the plant is exhibited by the fact that we have been able to operate with a maximum throughput per retort of 4 tons 3 cwt. and a minimum of 2 tons 19 cwt. This flexibility of the individual retort shows how mistaken is the idea that the relatively smaller number of retorts is a disadvantage. As a matter of fact, the daily variations of demand over long periods is entirely accounted for, not by putting retorts in and out of action, but by the regulation of the speed of throughput and output of a constant number of retorts in operation, a regulation for which the modern continuous vertical retort is admirably equipped. Four retorts in operation are regularly and easily adjusted to give a minimum of 200,000 c.ft. capacity per diem to a maximum of 330,000 c.ft.—that is to say, over nearly the whole range between the minimum and maximum daily demand.

A practical example of the value of this wide range of adjustment of the capacity of the retorts is that of the procedure adopted during scurfing in the summer months. At this season the daily demand is about 100,000 c.ft., which is met by two retorts in operation, each producing 50,000 c.ft. of gas.

Scurfing.

Scurfing is an operation which must be carried out every seven to twelve weeks; the period varies with the coal carbonized and the demand on the retort. It is an operation which takes from two to three days.

At first we were somewhat dubious about putting 50 p.ct. of our plant out of operation for scurfing, but experience has shown that there is no difficulty about it. We simply adjust the single retort in operation to its maximum of about 80,000 c.ft. per day, which means nothing more than an adjustment of the speed of the coke extractors and a notch or two extra on the steam regulating valve, with, of course, ordinary care to regulate the main damper to get sufficient heat in the setting for the increased duty. The balance of 20,000 c.ft. per day is taken out of stock until the operation is complete. When the two retorts are again in action they are adjusted to give 50,000 c.ft. per diem, as before.

A further advantage which we have found with verticals is the fact that the doubling of the demand during the winter calls for no extra employment of labour. The usual winter rush around Christmas time is a thing of the past. Only those who have had the experience of trying to meet a demand of 300,000 c.ft. per day with a plant designed to give 240,000 c.ft., and with but little possibility of increasing it, can appreciate the advantage of being able to vary the output of the plant by such simple means as setting the ratchet of the coke extractor and adjusting a steam valve. Personally, I should not like to go back to horizontals.

The operation of scurfing is one which calls for considerable care. There is no doubt that damage can be done to the refractory materials of the retort during this period, though with ordinary care this can be entirely avoided. The great thing is to prevent any rise in temperature above that of carbonizing. This cannot occur if the printed instructions of the designers of the plant are strictly adhered to.

Temperature Balance.

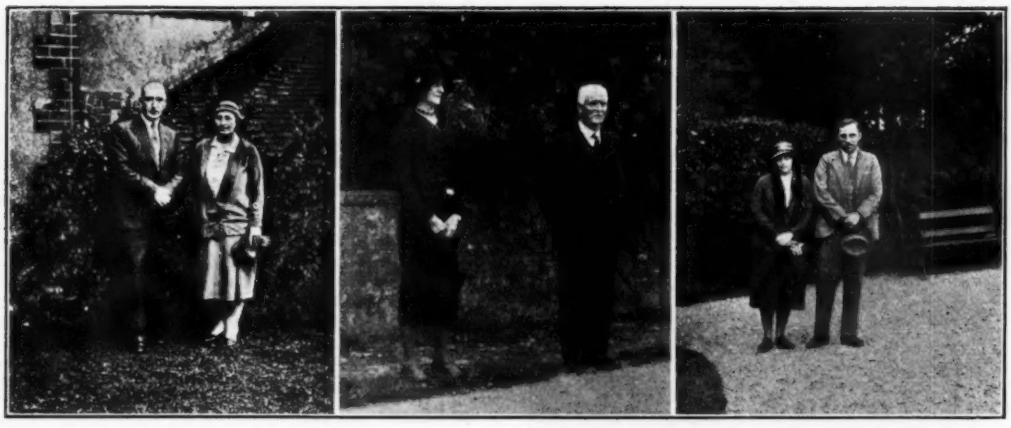
During gas-making the heat put into the retort is absorbed by the coal passing through it. During scurfing however, the temperature balance is disturbed. If the retort was merely emptied the temperature of the retort walls would rise. Further, the combustion of the scurf on the surface of the retort walls may give rise to an intense local heating. It is necessary, therefore, to adjust the current of air and steam through the retort so that sufficient air is admitted to ensure combustion without, on the one hand, raising the temperature unduly by too rapid combustion, and, on the other hand, without unduly cooling the retort by the admission of a large and uncontrolled volume of cold air to the retort. The maintenance of a moderate supply of steam during the scurfing operation is a great assistance in controlling the temperature.

The proportion of producer capacity to the daily demand for gas is a detail which received the careful consideration referred to before. A producer which is capable of supplying the full requirements of a retort unit capable of covering the demand for gas over the greater part of the year will give the maximum of fuel economy. The fact that we have secured this is shown by the figure of 1266 tons of coke actually sold last year, equivalent to 7 cwt.

Mr. G. Walmsley, Mrs. Hamilton, and Mr. J. Richmond, of Penicuik.

Mr. and Mrs. George Airth.

Mr. L. P. Phillips, Miss Gay Hamilton, Miss Dawsie Mearns, and Mr. J. A. Pemberton.



Mr. and Mrs. F. J. Edmonds, of Waterford.

Mr. and Mrs. L. G. Young, of Carlow.

Mr. and Mrs. G. Walmsley, of Londonderry.

of coke sold per ton of coal carbonized, after providing for the works boiler.

Further Advantages.

Such advantages as the increased make of gas per ton, low labour cost, and flexibility of operation are fairly easily seen and appreciated, but the further advantages of the ease and certainty of control, both of quality and quantity of gas made per diem, are no less valuable. With the horizontal retort the management was much in the hands of the stoker as regards weight of charge and its thorough burning off before discharge. Any irregularity in these respects was at once reflected in the quality of gas made, itself a factor which inevitably varies from hour to hour.

The continuous vertical retort is an instrument in the hands of the Manager which he can control himself, and that without any labour except of the mental kind for which he is fitted. In other words, control is a scientific operation kept in check by records and gauges, which can readily be organized to give complete control. As long as the several operations are carried out to time table and in accordance with the instructions which can be drawn up beforehand, there is no difficulty in maintaining constant and suitable conditions in the retort house.

It is sometimes objected that the vertical retort requires more skill and attention on the part of the management than, say, horizontal retorts, and this is true to the extent that if the best results are to be obtained, technical skill and ability must be applied to their control; but surely it is to the advantage of the gas engineer that this should be so, that he should be equipped with plant which will give a return for the skill expended upon its control, and it should be noted that there is not more, but less, skill required in the manual operation of the vertical retort. It is the skilful control of the Manager which is readily rewarded with results far beyond the reach of the older forms of carbonizing plant.

Quality of Coal and Coke.

Perhaps no better way of illustrating this point could be found than a consideration of the coals to be carbonized. It is generally assumed that vertical retorts are more "particular" with regard to coals carbonized than horizontals, but the fact is that while verticals will carbonize and give good results with any kind of coal, some coals give results out of all proportion to any extra cost entailed, and results out of all proportion, too, to any that be obtained in horizontal retorts. Not only is this the case as regards make of gas per ton of coal carbonized, though this is, of course, the first and most obvious advantage to be obtained from the use of some classes of coal, but the quality of the coke also depends largely upon the coal carbonized; indeed, very often the coal which gives the greater yield of gas per ton is not the best from the point of view of quality of coke. Much has been said about the blending of coals for this purpose. This is certain, that much may be done by intelligent mixing of coals to obtain a strong coke combined with an adequate return in the way of gas made per ton.

So far, then, from vertical retorts being only suitable for the larger gas-works, it is claimed that the experience of the smaller gas undertakings, particularly in the North of Ireland, has demonstrated that they are eminently suitable and convenient for those with annual makes ranging down to the capacity of one retort, with one, or at most two, more for stand-by and extension.

Discussion.

The President (Mr. L. G. Young, of Carlow) remarked that one thing in which perhaps Ireland differed from England was the coke market. They found in the South of Ireland that if one did not get so much gas per ton, and obtained a better quality coke and more of it, it paid in the long run. In Ireland in the past the tar market had been very bad, and with carbonization in horizontals tar could be used for firing the retorts. With horizontal retorts, again, on a small works one could have hand charging and a pushing machine which did extraordinary good work. There was, at the same time, a great deal of "press the button" about the paper, and that was certainly an advantage.

Mr. A. Law (Limerick) emphasized that vertical retorts were very flexible, and a foreman of ordinary intelligence could work well with them. If the load did suddenly jump, the situation could be dealt with easily; there was no need to call in extra men. He did not think that the progress made with the carbonizing plants in Ireland was what it should be. If managers re-organized their carbonizing plant, they would get further business. Would it be possible to bring about some form of combination which would enable the small undertakings to do this?

Mr. R. E. Gibson (Liverpool) agreed that the great advantage of the vertical retort was its flexibility. Very large makes per ton, he said, were nice, but it was impossible to make gas out of nothing, and these extra makes had to be produced out of the coke in the retort. The fact that this gas was being made at the expense of the coke was pointed to by the rather small amount of coke sold at Coleraine—7 cwt. per ton of coal carbonized. At Liverpool they were selling 11¼ cwt. per ton of coal. His Company had two kinds of verticals, as well as horizontals. They made rich gas in horizontals, and diluted it with water gas. The vertical retort was a wonderful piece of plant. Quite recently his own retorts had been making about 91 therms to the ton, which was somewhat better than the figure mentioned in the paper. The contribution of Mr. M'Elwee would be of great value to many gas undertakings in Ireland.

Tar Firing.

Mr. F. J. Edmonds (Waterford) said the whole question of vertical and horizontal retorts would have to be threshed out very closely for final conclusions to be arrived at. They must have a heat balance, and various matters had to be taken into consideration—such as the calorific value it was desired to send out. So far as small undertakings were concerned, he would like to remind the members of the paper which Mr. W. E. Young, of Queenstown, read a year ago on "Tar Firing of Retorts." With the smaller works tar seemed to be a drug on the market, and Mr. Young had shown them what could be done to counteract this. Under the direction of the General Manager, Mr. Anderson, who took a very great interest in small gas-works, he (the speaker) had put in a tar-burning apparatus, with the result that the coke went up from 11 cwt. to 14·5 cwt. per ton. In addition, the cost of working was very much reduced. While a year ago their cost of gas per therm into the holder was in the vicinity of 8·8d., it had come down to 2·1d., taking it on the year's working. This was a fact which should be taken very much to heart. If a small undertaking could see the way to save anything like 2d. per therm, or 10d. per 1000 c.ft. of 500 B.Th.U. gas, on carbonizing, it might mean salvation. In this way small works, instead of paying nothing, might provide a small dividend.

Towards Complete Carbonization.

Mr. J. M'Nicholl (Cork) remarked that vertical retorts were going in the direction of complete carbonization. He noticed from the paper that the author got 81·6 therms of gas per ton,

and that the amount of coke sold was 7 cwt. per ton of coal carbonized. Was this low yield the price the author had to pay for the flexibility of his carbonizing plant? Vertical retorts did score in the matter of giving more or less gas as desired. Did not this flexibility affect the yield of coke? For judging the heats, did the author rely simply upon the appearance of the combustion chamber, or did he use a pyrometer? In connection with scurfing, was there no danger of over-heating? Mr. Gibson had spoken of 11¼ cwt. of coke per ton of coal. Did this include breeze?

Mr. GIBSON: Breeze and coke.

Mr. M'NICHOLL: Our sale is over 10 cwt., and if I added breeze it would come to about the figure mentioned by Mr. Gibson. That is with horizontals.

Mr. M'ELWEE said he was a little bit disappointed with the coke sales for the year, but one could not have it both ways. One could not have a big yield of gas and a big yield of good coke. A load of coke such as he supplied to his big customers—bakers, nurseries, &c.—contained 13¼ cwt. with horizontals; but when they went over to verticals that load of coke weighed only 8 cwt. There were some complaints at first; but when it was found that the load contained 8 cwt. of coke instead of 13¼ cwt., it was realized that he was giving better value. He had not the actual figure of cost of gas into the holder, but so far as he remembered it was 1s. to 1s. 1d. per 1000 c.ft. The fuel consumption was certainly lower with a higher throughput. Two retorts working at full capacity would give the highest efficiency. When a retort went off for scurfing, it was under supervision the whole time. There was no danger of overheating. They used a pyrometer.

Mr. M'NICHOLL remarked that, while it might be possible to carbonize any kind of coal, one could not get good coke from some sorts, and in Ireland it was essential to have good coke.

GOLF COMPETITION.

On the morning following the excursion to Howth, there was a Golf Competition for the Grant Cup on the Woodbrook Golf Links. The winner proved to be Mr. F. J. Edmonds, of Waterford.

CARBURETTING VALUES OF GAS OILS*

A New Method for Their Evaluation

By A. HOLMES, Standard Oil Company of New Jersey, Elizabeth, N.J.

Prior to the introduction of cracking processes into the petroleum industry, little difficulty was experienced by the gas undertakings in securing gas oils satisfactory for the carburetion of water gas. Subsequently, however, a definite competition developed between gas undertakings and refiners operating cracking equipment for the paraffinic gas oils, the stocks best suited for gas-making purposes being in greatest demand for cracking. This demand for oils of the same general quality by the two interests resulted in the formulation of specifications by the gas companies covering the quality of gas oil to be delivered for gas-making purposes. Several such specifications are illustrated in Table I.

TABLE I.—*Gas Oil Specifications.*

—	A.	B.	C.	D.	E.
Gravity, ° A.P.I. (min.).	32	28	28	..	..
Sulphur, p ct. (max.) .	1	1	0·75	0·5	0·1
Colour	Dark	..	..	..	..
Viscosity, sec. . . .	40*	..	..	..	..
Flash	150 PM closed	..	..	..	..
B.S. and water . . .	1 p.ct. (max.)	..	..	None	None
Carbon, p.ct. (max). .	0·1	0·3	0·25	0·5	..
Pour, ° Fahr. (max.) .	..	..	..	..	0 (winter) ; 40 (summer)
Distillation, ° Fahr. . .	400–700	95 p.ct. (min.) at 400–700	95 p.ct. (min.) at 700	85 p ct (min.) at 400–700	70 p.ct. (min.) at 400–700. I.b.p. above 400° Fahr. Sp. gr. fraction above 600° Fahr. less than 0·91 (= 24·0° A.P.I.). Sp. gr. fraction above 700° Fahr. less than 0·92 (= 22·3° A.P.I.)
Added restriction . .	..	..	..	Must be straight run uncracked	Must be 100 p.ct. petroleum or petroleum product.

* Saybolt universal.

It will be noted that the quality of gas oil is in most cases described by gravity and boiling-point range. This does not give the control desired, and in many cases works a hardship on both the gas manufacturers and the petroleum refiner.

The present work was undertaken in order to develop a method which would more definitely reflect the quality in a gas oil desired by gas manufacturers, thus permitting the selection of satisfactory stocks which are barred by present specifications, and would be of mutual benefit to all concerned. As a basis for this work, there existed a laboratory carburetting method developed by the Brooklyn Union Gas Company and recently described in detail by Murphy[2] for evaluating gas oils by using them in actual carburetion under laboratory conditions closely paralleling those existing in the plant.

Since the experience obtained with this apparatus in the present work has revealed no additional information in regard to its operation, its description will not be repeated here. However, the petroleum refiner is more interested in comparative values, and from a series of tests it appears that the requisite information for this purpose can be obtained by carrying out all the carburetting tests at 1500° Fahr., correcting the results to the use of a 300 B.Th.U. blue gas when the heating value of this gas varies from this figure, and expressing the gasification value of the oil as the number of gallons required per 1000 c.ft. of finished gas having a heating value of 530 B.Th.U. per c.ft.

GRAVITY AND BOILING RANGE.

Of the various qualities which have been cited in specifications of gas oil, the gravity and the boiling range are the most indicative of its chemical composition, and therefore of its carburetting value. Gravity alone has but little value in classifying gas oils, and the reason for attempting to limit to above 28° A.P.I. is not clear, since there are many good oils having a much lower gravity. This is seen from the data given in Table II.

The boiling range, on the other hand, has much greater significance. This must become apparent when it is considered that, in carburetting, it is sought to break the oil down into the maximum total heating value of gaseous products consistent with the gain in the heating value of the finished gas. This implies that the cracking is not extended so far as to produce appreciable amounts of hydrogen but stops with the production of the gaseous hydrocarbons. Obviously, in any one group of hydrocarbons, the larger the molecule, the greater should be the volume of the gaseous products capable of being produced from a given amount of material. Since for any one series of homologous compounds the boiling-point increases with the size of the molecule, then the higher the boiling-point of an oil, the more desirable it should be for carburetting purposes; that is, of course, provided its chemical characteristics do not change otherwise with the change in boiling-point. Practically, however, the chemical natures of petroleum distillates from any one stock generally do change with the boiling-point, becoming progressively unsaturated with the heavier fractions. This is even more noticeable with cracked distillates and

is exemplified by data in Table III. under the heading of 98 p.ct. acid residue.

The latter fact would naturally lead to the conclusion that a boiling restriction, such as has been prepared, would insure the gas undertakings of receiving the most satisfactory oils from any given source, irrespective of the considerations mentioned above—namely, that they should boil as high as possible. A series of experiments was carried out to determine the value of a boiling-range limitation as an index of gas oil quality for carburetting purposes. A few representative data are illustrated in Table III. in which a cycle gas oil, obtained from cracking

TABLE II.—*Data at Carburetting Temperature 1500° Fahr.*

Run.	Sample.	Description.	Gravity. °A.P.I.	Sp. Gr. $\frac{60°}{60°}$	Gal./M. for 530 B.Th.U. Gas.
29	PGOB–30	Paraffin gas oil	25·7	0·9001	2·85
30	PGOB–50	" " "	27·5	0·8899	2·84
35	PUB–OO	24 + gas oil	24·2	0·9088	2·94
43	OZL	Medicinal oil	26·6	0·8950	2·75
51	WT-CS-FB	Cracked gas oil	28·1	0·8866	3·27
44	PA-OO-SE	SO_3 extract	27·8	0·8883	3·15

TABLE III.—*Carburetting Value vs. Fraction of Cracked Stock.*

Run.	Sample.	Distillation.					98 P.Ct. Acid Residue. Vol. P.Ct.	Gal./M. for 530 B.Th.U. Gas.
		Gravity. °A.P.I.	I. B.P. °Fahr.	Temp. at 50 P.Ct. °Fahr.	At 650° Fahr. Vol. P.Ct.	F. B.P. °Fahr.	Av. B.P. °Fahr.	
20	WT-CS	25·3	350	561	80	760	571	61	3·33
50	WT-CS-FA	32·7	324	470	100	598	470	74	3·40
51	WT-CS-FB	28·1	473	517	100	578	520	68	3·27
52	WT-CS-FC	23·9	542	588	93	690	592	62	5·10
53	WT-CS-FD	16·0	600	697	8	750	693	52	3·90

West Texas gas oil, was distilled into four equal fractions, and their several carburetting values determined.

It will be noted from these results that none of the fractions would be considered as acceptable if it were required that a satisfactory oil should not exceed 3 gallons per 1000 c.ft. for a 530 B.Th.U. gas, although the oils used in runs 50 and 51 are well within the generally accepted limits of gravity and boiling range.

(To be concluded.)

Gas Oil for Benzole Recovery*

The authors dealt with the cause of deposition of sludge and emulsion when using gas oil as a scrubbing medium. They pointed out that the general practice in this country for the absorption of benzole vapours from coal gas had been for many years to use creosote oil. The ideal absorbent to use was one which possessed the following properties: (1) High absorptive capacity, (2) low viscosity, (3) high initial boiling point, (4) low specific heat. On these qualities depended to a great extent the efficiency of benzole recovery. There were, of course, other factors which had an important bearing in this respect. Supplies of creosote oil had generally been available on most coke oven plants, as a direct fraction from tar distillation, and this no doubt had been responsible for its general adoption for benzole recovery in this country. In America the unlimited supplies and low cost of gas oil had resulted in its exclusive use.

Continuing, the authors pointed out that the creosote used in the investigations was a technical sample of coke oven creosote, from which a preliminary fraction distilling up to 205° C. using a six-bulb Young column had been removed. The oil itself was not re-distilled before use, and had the following characteristics: Specific gravity at 20° C., 0·9980; viscosity at 20° C. (Redwood secs.), 40·5; distillation range (bar. pressure 744·1 mm.) p.ct. by volume distillate at 200° C., *nil;* 225°, 12·5; 250°, 49·5; 275°, 67; 300°, 78; 325°, 87; 350°, 94·5 p.ct. Of tar acids there were traces only; naphthalene, 17·8 p.ct. by weight.

The gas oil was a technical sample of oil recommended for benzole recovery. The oil had the following characteristics: Specific gravity at 20° C., 0·8625; viscosity at 20° C., 42; distillation range (bar. pressure 753·7 mm.) p.ct. by volume distillate at 223° C., *nil;* 250°, 14·5; 275°, 37·5; 300°, 56·5; 325°, 72; 350°, 83; 375°, 91 p.ct. Observed absorptive capacity of creosote and gas oil with temperature showed that creosote oil has a somewhat higher absorptive capacity than gas oil. In this respect, therefore, it would seem to be more advantageous to use creosote oil. There are, however, advantages possessed by gas oil which when taken into account may favour its adoption. These are: (1) Lower viscosity at low temperatures, (2) absorptive capacity of oil tends to rise while in use, (3) freedom from naphthalene, (4) consumption of oil per gallon benzole, (5) cost.

BEHAVIOUR OF ABSORBENT OILS.

The behaviour of absorbent oils in use differs to a great extent. With creosote oil, which is aromatic in nature, the absorption of solid and resinous materials from the gas and removal of the lighter boiling fractions during distillation results in thickening of the oil, the speed of thickening being governed by the character of the oil and the conditions under which it is used. This necessitates periodic removal or dilution of the oil in circulation in order to maintain a high scrubbing efficiency. The oil removed is generally re-distilled and, after settling out naphthalene, is returned to circulation, the high boiling constituents absorbed by the oil during circulation being left behind in the pitchy residue.

Where gas oil is used, the solubility of the resinous substances in the gas is much less pronounced, and some of the resinous matter may separate and be deposited as a fine sludge. In addition, this fine deposit or suspension may act as an emulsifying agent when the oil is treated with steam. The result of this sludging and emulsification, if not prevented or removed, results in blockage of scrubbers, pipe lines, heaters, &c., necessitating frequent cleaning, with a low efficiency of benzole recovery while these units are out of commission.

Regarding causes of thickening or sludging of wash oils, on which there is considerable divergence of opinion, the authors working on a laboratory scale, came to the following conclusions with regard to their own conditions: (1) The passage of sulphuretted hydrogen for prolonged periods through either cold or hot gas oil, although causing a slight darkening in colour, did not produce thickening or sludging; (2) air or oxygen either alone or in the presence of steam, although producing a slight increase in viscosity and specific gravity, did not cause sludging; (3) sludging was produced when crude gas from the final coolers was passed through new cold gas oil, or when a heavy tar oil was added to gas oil; (4) tar oils present as a fog in the gas leaving the final coolers were abstracted and distilled in fractions, starting at 190° C. and rising in steps of 10°. No sludging was produced when fractions up to 300° C. were added singly or combined to new gas oil or to new oil saturated with sulphuretted hydrogen. Sludging was immediately produced by the addition of the fraction boiling above 300° C. The presence of solid matter in suspension in the oil greatly increases the tendency of gas oil to form emulsions, the sludge coating the globules of water and preventing their coalescence.

The authors are of the opinion that the chief cause of the thickening and sludging of gas oil is due to the absorption of high-boiling tar compounds of high sulphur content, some of which are soluble in gas oil, while others are insoluble, although the latter are soluble in creosote oil and benzole.

As a wash oil deteriorates owing to the absorption of heavy tarry matter and loss of lighter fractions in the stripping still, the mean molecular weight increases. This increase in mean molecular weight is accompanied by a decrease in absorptive capacity. The absorptive capacity of creosote oil decreases fairly rapidly with use. On the other hand, owing to the insolubility of a large percentage of the tarry matter in gas oil, the increase in mean molecular weight is not as rapid, and in practice the absorptive capacity generally increases with use, owing to the absorption of naphthalene. The increase in viscosity of a wash oil reduces the rate of absorption of benzole in the scrubbers and also the efficiency of heat transfer in heat exchanges, preheaters, and coolers.

The authors had considerable difficulty with emulsions of gas oil and water, especially when the specific gravity of the circulating oil was above 0·9. Table I. illustrates the differences in the properties of creosote and gas oil and shows the effect of thickening of the creosote and sludging

* From a paper on "Experiences with Gas Oil for Benzole Recovery," read before the Midland Section of the Coke Oven Managers' Association by F. White and S. Kellett, B.Sc. Abstracted by the "Iron and Coal Trades Review."

of gas oil during use for benzole recovery from coke oven gas.

TABLE I.—*Properties of Creosote and Gas Oil showing Effect of Thickening and Sludging during Use for Benzole Recovery.*

—	Gas Oil (After Deposition of Sludge).	Creosote.
Specific gravity at 20° C.—		
(1) Fresh oil	0·852	1·040
(2) Average oil in circulation	0·900	1·103
Viscosity at 20° C. (Redwood Seconds)—		
(1) Fresh oil	40	40
(2) Average oil in circulation	53·5	Over 210
Absorptive capacity of 20° C. (vol. per 100 vol. of oil)—		
(1) Fresh oil	3·05	4·5
(2) Average oil in circulation	3·2	3·8
Distillation range (p.ct. by vol. distillate at 250° C.)—		
(1) Fresh oil	11	50
(2) Average oil in circulation	3	9

A number of methods have been suggested for eliminating wash-oil sludge, and the authors have tried some of these both on experimental and large-scale plants. From their own observations and examination of the sludge, they arrived at the conclusion that high gas temperature to scrubbers is responsible for carrying forward tar fog, the greater proportion of which will precipitate in the circulating oil, find its way through the distillation plant, and finally be deposited in various parts of the plant. It is evident that in order to minimize the trouble, a low gas temperature to scrubbers is essential.

The authors then proceeded to describe tests carried out with apparatus for the filtration of gas oil. They are now relying on a sludge tank and coke filter, and although the efficiency of removal is not as high owing to the finer state of the solids in suspension, the general circulation oil is fairly clean, and little or no trouble is experienced with blockages on scrubbers, accumulation of sludge in debenzolized and benzolized tanks, heaters, &c. After changing to gas oil the yield of benzole per ton of coal was higher than when creosote oil was used, and still higher yields are being obtained since alterations (described in the paper) were made. A high efficiency of recovery is being maintained in spite of the fact that the carbonizing and recovery plants have worked at 16 p.ct. above their rated capacity.

Gas Companies' Results.

Cork.

In their report for the half-year ended June 30, 1932, the Directors of the Cork Gas Consumers' Company state that there has been a substantial increase in the quantity of gas sold as compared with the corresponding half-year of 1931. The balance of profit and loss is £4605; and it is proposed to pay the usual dividend at the rate of 8 p.ct. per annum.

Kinross and Milnathort.

An increase in gas consumption during the past financial year was reported by Provost Ross, the Chairman, at the annual general meeting of the Kinross and Milnathort Gas Company. The report of the Directors showed a profit of £479, and it was agreed to pay a dividend of 5 p.ct., less income-tax.

Hathersage.

The Directors of the Hathersage Gas Company, Ltd., in their annual report for the year ended June 30, 1932, state that on the revenue account, after providing for depreciation, there is a profit of £2779. The total profit for the year amounted to £3028. To this has to be added the unappropriated balance from the previous year (£2012), making £5040. The interim dividend of 5 p.ct., less income-tax, and debenture interest absorbed £1145, leaving for disposal £3895, which the Directors recommend shall be applied in paying a final dividend at the rate of 5 p.ct. on the paid-up capital of the Company, making 10 p.ct. for the year, less income-tax, and carrying to reserve £300. There remains a balance of £2657 to carry forward.

Langley Mill and Heanor.

The Directors' report on the year's working of the Langley Mill and Heanor Gas Light and Coke Company, Ltd., shows that the amount realized for gas, meter, and stove rent during the year is £26,256, against £25,791 during the previous year. Residuals show an increase of £667. After deducting dividends paid on Sept. 1, 1931, and on March 1, 1932, and transferring the sum of £90 to reserve fund, the profit and loss account shows an available balance of £10,526, out of which the Directors recommend that a further dividend of 6s. per share be paid on the "B" shares, 4s. 6d. per share on the "C" shares, making 12 p.ct. and 9 p.ct. respectively for the year, and 2s. 6d. per share on the "A" preference shares, and 3s. per share on the "D" 6 p.ct. preference shares, less income-tax, that the sum of £350 be transferred to reserve fund, and the balance be carried forward to next year's account.

Melton Mowbray.

At the annual meeting of the Melton Mowbray Gas Company it was reported that 4758 tons of coal was carbonized during the year and that 51 million c.ft. of gas was sold. Through ordinary meters the quantity sold was of the value of £4408, and through slot meters £9272. An interim dividend of 20s. was paid last February, and the Directors recommended a final dividend of 20s. per share, less tax, making 10 p.ct., this being agreed to.

Sherborne.

In the Director's Report, submitted at the annual meeting of the Sherborne Gas and Coke Company, Ltd., it was stated that the capital account shows a balance of £12,606 and the revenue account a balance of profit on the year's transactions of £2614. The profit and loss account, after paying interest on debentures and loans, shows an available balance of £9819, from which amount the Directors recommended dividends of 5 p.ct. on the preference shares and 10 p.ct. on the ordinary shares, both less income-tax. The sale of gas for the year was 61,073,800 c.ft., a decrease of 2,066,600 c.ft.

Corporation Undertakings' Results.

Brighouse.

In his annual report for the year ended March 31, 1932, Mr. C. R. Ingham, Engineer and Manager to the Brighouse Gas Department, states that the gas sent out during the year amounts to 197 million c.ft., being 1,565,000 c.ft. more than in the previous year. The gas sold and used is 193 millions, being 2,734,000 c.ft. more than in 1930-31. The gas unaccounted for is 3,852,000, which is 1·95 p.ct. of the output. This must be one of the very lowest returns in the country, and is most gratifying, particularly so as 254,000 c.ft. of this is due to the volume of benzole vapour removed from the gas after it is measured. There is also a reduction in volume of the gas due to the removal of water vapour. This is difficult to estimate, but probably a figure of 0·3 p.ct. of the total output is on the low side.

Dunfermline.

The gas made by the Dunfermline Gas Department during the year ended May 15, 1932, amounted to 370 million c.ft.—an increase of 3½ millions. A net surplus of £819 was the result of the year's work. This has been deducted from a debit balance brought in, leaving £138 to be carried forward against the current year. Mr. James Campbell, the Engineer and Manager, explains that the new scale of charges for gas has now been in operation for a full year, and has fully justified the change. Under this scale, the price of gas is dependent upon the quantity purchased and not upon the purpose for which it is used, thus enabling the Department to secure customers who would, under the old rates, have found it impossible to use gas because of the cost. The following table shows the amount of gas used in the various blocks:

Block.	Total Gas Used in Block.	Percentage.
Up to 24,000 c.ft. per annum	194,321,200 c.ft.	69·19
Between 24,000 and 100,000 c.ft per annum	62,934,800 ,,	22·41
,, 100,000 and 500,000 ,, ,,	18,812,000 ,,	6·70
,, 500,000 and 1,000,000 ,, ,,	3,228,300 ,,	1·15
,, 1,000,000 and 2,000,000 ,, ,,	1,301,100 ,,	0·46
Over 2,000,000 c.ft. per annum	229,400 ,,	0·09

The above figures do not include supplies of gas in bulk or street lighting.

Salford.

While the number of consumers continues to increase, there has been a decrease in the sales of gas amounting to 4·04 p.ct. for the year ended March 31 last. This decrease is due to the continued depression in trade and industry, increasing competition generally by oil and electricity, and the substitution of electricity for gas in main road lighting, and the exceedingly mild weather experienced during the past winter. In order to popularize the use of gas and make its many advantages better known to the general public, the Committee has recently established a "New Gas" House. This house was officially opened by the Mayor of Salford on May 5, and is attracting much attention in the neighbourhood, over 15,000 people having already inspected it.

Gas Acts (1920 and 1929) Orders.

SPECIAL ORDERS.

Weymouth Consumers' Gas Company.

The authorize the Company to raise additional capital, to define or fix a basic price or basic prices for gas, to prescribe a basic rate of dividend on the ordinary capital, and for other purposes.

REGISTER OF PATENTS

Removal of Naphthalene and Gum-Forming Constituents from Coal Gas.—No. 374,975.

KOPPERS COMPANY, of Pittsburgh (Assignees of POWELL, A. R., of Elizabeth).

No. 8902; March 23, 1931. Convention date, July 22, 1930.

Nowadays gas frequently contains so little condensible oil that naphthalene stoppages and troubles may occur even when the gas leaving the works contains as little as 5 or 6 grains of naphthalene per 100 c.ft.

Gum troubles in gas distributing systems somewhat resemble naphthalene troubles. Both are caused by constituents normally present in the gas in comparatively small amounts.

An object of the invention is to provide a process for the removal of gum-forming constituents from fuel gases, especially from "wet" fuel gases such as carburetted water gas of high condensible oil content. A second object of the invention is to provide a process of removing gum-forming constituents from fuel gases that shall also remove naphthalene, and suitable apparatus therefor. A further object is to provide a method of operating naphthalene removal apparatus of the type in which naphthalene is removed from fuel gases treated therein by a countercurrent of absorbent oil, which method will also make possible the removal of gum-forming constituents from the gas treated to an extent never before attained in practice.

The claims made are:

1. A process for removing both naphthalene and gum-forming constituents from fuel gas which comprises contacting the gas with re-circulated solvent and then contacting the same gas with a quantity of substantially uncontaminated solvent materially in excess of the amount required merely for the substantially complete removal of naphthalene from the gas.

2. A process as claimed in Claim 1, wherein the amount of uncontaminated solvent employed is equal to at least 1 p.ct. of the amount of the re-circulated solvent.

3. A process as claimed in Claim 1, wherein the uncontaminated solvent is supplied to the gas at a rate of at least, or more than, 200 gallons per million c.ft. of gas.

4. A process as claimed in Claim 1, wherein the uncontaminated solvent is supplied intermittently.

5. A process as claimed in Claim 1, wherein the uncontaminated solvent, after use, is added to the re-circulated solvent, employed in the first stage of the process.

6. A process as claimed in Claim 1, which comprises passing the gas upwardly through a tower containing a plurality of sections, re-circulating solvent through the gas in a lower section of the tower so as partially to remove the naphthalene and gum-forming constituents from the gas, supplying substantially uncontaminated solvent to an upper section of the tower in a quantity materially in excess of the amount required merely for the substantially complete removal of naphthalene from the gas and contacting the gas with the uncontaminated solvent.

Wet Gas Meters.—No. 375,023.

PARKINSON & COWAN (GAS METERS), LTD., and BUTTERWORTH, E., of Kennington Road, S.E. 11, and THORP, F., of Manchester.

No. 13,077; May 4, 1931.

The following claims are made for this invention: In a wet gas meter comprising a plurality of inter-connected pairs of liquid sealed bells, each pair constituting a balance unit and being contained in a separate gas section of the meter, and each bell being contained in a separate compartment of a section, the space above one bell being in communication with the space below the other bell of a pair, the provision of valves in the several compartments of the meter for controlling the inflow of gas to and the outflow of gas from each such compartment, the valves and bells of the meter being operatively inter-connected to provide a continuous gas delivery from the meter.

In a wet gas meter as claimed, the employment of liquid sealed oscillatory valves in the several compartments of the meter for controlling the inflow of gas to and its outflow from each compartment.

In a wet gas meter, in combination, two pairs of bells, each pair carried by and oscillating with a common shaft, and each bell being in a separate compartment of the meter with its own sealing liquid, a conduit leading from beneath each bell of a pair to above the liquid level in the compartment containing the other bell of the pair, an oscillatory liquid sealed valve in each compartment controlling the inflow of gas to and its outflow from that compartment, the valves associated with one pair of bells being operated from the shaft carrying the other pair of bells, and the movements of the bells being co-related through the index mechanism to ensure a continuous delivery of gas from the meter.

Mass Production of
STANTON
Standard "Special" Castings
BIG PRICE REDUCTIONS

IMMEDIATE DELIVERY FROM STOCK
The Stanton Ironworks Company Limited Nr. Nottingham

STOCK AND SHARE LIST.

Official Quotations on the London and Provincial Stock Exchanges.

[For Stock Market Report, see later pages.]

Issue	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Aug. 26.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
1,551,868	Stk.	Apl. 4	7⅜	7⅜	Alliance & Dublin Ord. ...	100—110	...	100½—100⅞
374,000	,,	July 4	4	4	Do. 4 p.c. Deb. ...	80—90	...	...
557,655	,,	Aug. 22	7	7	Barnet Ord. 7 p.c.	132—142*	−3	...
300,000	1	Apl. 29	1/4⅓	1/9⅔	Bombay, Ltd.	15/—20/-	...	19/—20/-
177,750	Stk.	Aug. 22	9	9½	Bournemouth sliding scale	177—187*	−3	...
550,050	,,	,,	7	7	Do. 7 p.c. max. ...	132—142*	−5	...
439,160	,,	,,	6	6	Do. 6 p.c. Pref. ...	128—133*	−2	130
50,000	,,	June 20	3	3	Do. 3 p.c. Deb. ...	70—75	...	...
162,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	90—95	...	...
210,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	115—120	...	...
					Brighton, Hove, & Worthing			
367,900	,,	Aug. 22	7½	7½	6 p.c. Con. ...	135—145*	...	...
540,000	,,	,,	6⅔	6⅔	Do. 5 p.c. Con. ...	120—130*	...	...
195,500	,,	,,	6	6	Do. 6 p.c. B Pref.	127—132*	−2	...
1,287,500	,,	Aug. 8	5	5	Bristol 5 p.c. max.	107—109a	...	...
120,420	,,	June 20	4	4	Do. 1st 4 p.c. Deb. ...	92—94a	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	90—94a	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	115—120a	...	...
855,000	,,	Apl. 4	7	8	British Ord.	132—142	...	134—136½
100,000	,,	June 20	7	7	Do. 7 p.c. Pref.	120—130	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	87—92	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	105—115	...	...
160,000	,,	July 4	5	5	Cambridge 5 p.c. Deb. ...	114—119	...	115—116
100,000	10	May 23	6	6	Cape Town, Ltd.	7¼—8½	...	7¼—7⅝
100,000	10	Apl. 20	4½	4½	Do. 4½ p.c. Pref. ...	6—7	...	6¼
150,000	Stk.	June 20	4½	4½	Do. 4½ p.c. Deb. ...	87—92	+4½	89½—90
626,860	,,	Aug. 8	6	6	Cardiff Con. Ord.	98—103	...	...
237,860	,,	July 4	2⅜	5	Do. 5 p.c. Red. Deb.	105—110	...	...
157,150	,,	Aug. 8	6½	5	Chester 5 p.c. Ord.	89—94b	...	...
98,936	1	May 23	2/-	2/-	Colombo, Ltd. Ord.... ...	26/—31/-	...	...
24,500	1	,,	1/4⅓	1/4⅓	Do. 7 p.c. Pref.	18/—20/-	...	...
609,204	1	Apl. 4	-/10'90	-/11'47	Colonial Gas Assn. Ltd. Ord.	10/—15/-	...	...
296,053	1	,,	1/2'54	1/3'30	Do. 8 p.c. Pref.	10/—15/-	...	...
2,079,280	Stk.	Aug. 8	5⅔	5	Commercial Ord.	102—107	...	103½—104
475,000	,,	June 20	3	3	Do. 3 p.c. Deb. ...	70—75	...	72½
807,560	,,	Aug. 8	7	7	Croydon sliding scale ...	130—140	...	...
469,590	,,	,,	5	5	Do. max. div.	95—100	...	97—98½
500,000	,,	July 4	5	5	Do. 5 p.c. Deb.	115—120	...	117½
542,270	,,	Aug. 8	10	7	Derby Con.	120—130e	...	...
55,000	,,	July 4	4	4	Do. 4 p.c. Deb.	75—85c	...	...
209,000	,,	Mar. 14	5	5	East Hull Ord. 5 p.c. ...	95—100	...	95½—96
179,500	,,	Aug. 22	5⅔	6	East Surrey Ord. 5 p.c. ...	108—118*	−2	...
155,019	,,	June 20	5	5	Do. 5 p.c. Deb. ...	114—119	...	...
1,002,180	,,	Mar. 14	14	16⅔	European, Ltd.	105—115	+7	107—114
19,405,992	,,	Aug. 8	5⅔	5⅔	Gas Light & Coke 4 p.c. Ord.	22/—24'-g	...	22/3—22/10½
2,600,000	,,	,,	3⅔	3⅔	Do. 3½ p.c. max.... ...	80—85	...	80—80½
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	95—100	...	97½—98½
6,102,497	,,	June 20	3	3	Do. 3 p.c. Con. Deb. ...	75—80	...	76⅔—78
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	108—113	...	109½—112
2,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	105—110	...	107—107½
264,011	,,	Aug. 22	—	6	Harrogate New Cons. ...	104—109*	−2	...
82,500	,,	Aug. 22	7	7	Hastings & St. L. 5 p.c. Conv.	118—128*	−2	...
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	88—93*	−2	...
70,000	10	June 6	15	10	Hongkong & China, Ltd. ...	10—11	...	...
213,200	Stk.	Aug. 22	6	6	Hornsey Con. 3½ p.c. ...	103—105*	−2	...
5,600,000	,,	June 6	15	14	Imperial Continental Cap.	187—197	...	192—195
223,130	,,	Aug. 8	3½	3½	Do. 3½ p.c. Red. Deb.	81—86	...	...
235,242	,,	Aug. 8	8½	8½	Lea Bridge 5 p.c. Ord. ...	142—152	...	...
2,145,907	,,	Aug. 22	6	6	Liverpool 5 p.c. Ord. ...	110—115 b*	−1	...
245,500	,,	June 20	5	5	Do. 5 p.c. Red. Pref. ...	100—110 b	...	...
306,083	,,	July 15	4	4	Do. 4 p.c. Deb. ...	85½—90 b	...	...
165,786	,,	Feb. 15	8	10	Maidstone 5 p.c. Cap. ...	155—165	...	...
56,176	,,	June 20	3	3	Do. 3 p.c. Deb. ...	65—70	...	...
76,000	b	June 20	110	110	Malta & Mediterranean ...	7½—8½	...	...
					Metropolitan (of Melbourne)			
892,000	—	Apl. 1	5½	5½	5½ p.c. Red. Deb.	95—100	...	97—97½
171,978	Stk.	Feb. 29	5	5	M. S. D. Utility "C." Cons.	88—93	...	...
718,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	82—87	...	84—85½
112,126	,,	July 4	4	4	Do. 4 p.c. Deb. ...	87—92	...	...
148,955	,,	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...	...
675,000	,,	21 May '31	16	16	Montevideo, Ltd.	40—60	...	...
2,061,315	,,	Aug. 8	5⅔	5	Newcastle & Gateshead Con.	20/—21/-d/	...	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	89½—90½d	...	...
691,705	,,	June 20	3½	3½	Do. 3½ p.c. Deb. ...	87—89d	−1	...
277,245	,,	Apl. 29	5	5	Do. 5 p.c. Deb. '43 ...	105—110d	...	...
274,000	,,	Aug. 8	5	5	Newport (Mon.) 5 p.c. max.	85—87a	−⅛	...
199,940	,,	Aug. 22	7½	7½	North Middlesex 6 p.c. Con.	135—145*	...	...
936,160	,,	Aug. 8	5	5	Northampton 5 p.c. max. ...	88—93	...	...
300,000	,,	Apl. 18	9	7	Oriental, Ltd.	85—95	...	92
205,162	,,	June 20	8	8	Plym'th & Stonehouse 5 p.c.	140—150	...	...
604,416	,,	Aug. 22	8	8	Portsm'th Con. Stk. 4 p.c. Std.	137—147*	−3	140
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	88—93*	−2	90
114,000	,,	Aug. 8	5	5	Preston 5 p.c. Pref.	100—105	...	...
686,312	,,	July 18	4	4	Primitiva 4 p.c. Rd. Db. 1911	75—80	...	...
389,813	,,	June 20	4	4	Do. 4 p.c. Cons. Deb.	76—81	...	...
150,000	10	Apl. 4	6	6	San Paulo 6 p.c. Pref. ...	7—7½	...	...
1,736,968	Stk.	Apl. 4	6	6	Sheffield Cons.	108—112e	...	...
95,000	,,	July 18	4	4	Do. 4 p.c. Deb.	90—94c	...	...
133,201	,,	Feb. 29	8½	5	Shrewsbury 5 p.c. Ord. ..	110—115	...	...
90,000	10	June 6	15	15	South African	4—6	...	...
6,709,895	Stk.	Aug. 8	7	5	South Met. Ord.	114—118	−½	114½—116½
1,136,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	130—135	...	132—133
1,895,445	,,	July 4	3	3	Do. 3 p.c. Deb. ...	75—80	...	76
1,000,000	,,	July 18	4	5	Do. 5 p.c. Red. Deb.	108—113	...	...
91,500	,,	Aug. 8	8½	8½	South Shields Con.	129—131d	...	...
1,543,795	,,	Aug. 8	6	6	South Suburban Ord. 5 p.c.	112—117	−3	112—117
300,000	,,	,,	5	5	Do. 5 p.c. Pref.	108—113	...	...
668,827	,,	June 20	5	5	Do. 5 p.c. Deb.	116—121	...	116—117½
647,740	,,	Aug. 22	5	5	Southampt'n Ord. 5 p.c. max.	93—98*	−2	96⅔
121,275	,,	June 20	4	4	Do. 4 p.c. Deb.	88—93	−2	...
200,000	,,	June 20	6½	6½	Swansea 6½ p.c. Red. Deb.	105—110	...	105½
1,076,490	,,	Aug. 8	6⅔	6⅔	Tottenham and District Ord.	127—132	...	128
300,000	,,	,,	5⅔	5⅔	Do. 5½ p.c. Pref. ...	114—119	...	...
199,005	,,	June 20	4	4	Do. 4 p.c. Deb. ...	91—96	...	...
85,701	,,	Apl. 4	6	6	Tuscan, Ltd., 6 p.c. Red. Db.	70—75	...	...
					Uxbridge, Maidenhead, &			
346,069	,,	Aug. 22	7	7	Wycombe 5 p.c.	128—138*	...	...
88,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	100—105*	...	...
1,392,220	,,	July 4	7	7	Wandsworth Consolidated	135—140	...	135—135½
971,373	,,	,,	5	5	Do. 5 p.c. Pref.	109—114	...	109
1,167,964	,,	June 20	5	5	Do. 5 p.c. Deb.	115—120	...	117½
158,400	,,	Aug. 22	6g	5	Winchester W. & G. 5p.c. Con.	98—103*	−2	...

Quotations at:—*a*.—Bristol. *b*.—Liverpool. *c*.—Nottingham. *d*.—Newcastle. *e*.—Sheffield. *f*.—The quotation is per £1 of stock ‖ Paid £3 including 10s. on account of back dividends. * Ex. div. † Paid free of income-tax. ‡ For year.

FINANCIAL.

£100,000 Private Capital available for INVESTMENT in DEBENTURES of approved Gas Companies.

Particulars of requirements, in confidence, to ROBERT MCGOWAN, 64, VICTORIA STREET, LONDON, S.W. 1.

STOCK FOR SALE BY AUCTION.

TO INVESTORS, CAPITALISTS, AND SPECULATORS.

SALE OF

£10,000 GOSPORT GAS STOCK

On Wednesday, 14th September, at 6.30 p.m.

AT GOSPORT ESTATE SALE ROOMS, "STAR CHAMBERS," 35 & 36, HIGH STREET.

By Order of the Board of Directors.

Under the Gosport Gas Acts and Orders, 1865-1931.

LLEWELLYN PUTTOCK & BLAKE

are favoured with instructions to SELL BY PUBLIC AUCTION as above,

£10,000

FIVE PER CENT. DEBENTURE STOCK (Redeemable at par, 1943), in the GOSPORT DISTRICT GAS COMPANY, in Lots of £20, £50, and £100.

Free of any Fees to Purchasers.

Printed Particulars will be forwarded free upon application to the CHIEF OFFICES of the COMPANY, HIGH STREET, GOSPORT, at the BRANCH OFFICES, LEE-ON-THE-SOLENT, FAREHAM, and BISHOP'S WALTHAM, or of the AUCTIONEERS, LLEWELLYN PUTTOCK & BLAKE, 123, HIGH STREET, GOSPORT.

EDUCATIONAL.

THE POLYTECHNIC,
REGENT STREET, W. 1.

SCHOOL OF CHEMISTRY.

Head of the School:
H. LAMBOURNE, M.A., M.Sc., F.I.C.

EVENING COURSES in GAS ENGINEERING AND MANUFACTURE.

Lecturers { F. WHITE, B.Sc., A.M.I.C.E.
{ W. R. BRANSON, B.Sc., A.M.I.C.E.

Term commences 26th September, 1932. Enrolments from 19th September.

A FULL-TIME DAY COURSE in Chemistry is also provided for the External B.Sc. Degree (General and Special) of London University, and for the A.I.C. Diploma of the Institute of Chemistry.

Term commences 20th September.

Full Particulars free on application to the DIRECTOR OF EDUCATION.

TROTTER, HAINES, & CORBETT LIMITED
BRETTEL'S ESTATE
FIRE-CLAY & BRICK WORKS
STOURBRIDGE

Manufacturers of GAS RETORTS, GLASSHOUSE FURNACE & BLAST FURNACE BRICKS, LUMPS, TILES, and every Description of FIRE BRICKS.

Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.

SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: E. C. BROWN & CO., LEADENHALL CHAMBERS, 4, ST. MARY AXE, E.C.

GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see earlier page.]

The stock markets continued to show a bright tendency last week. The chief centre of interest was in the Miscellaneous group, and with an appreciable increase in the volume of business numerous rises in prices were recorded, though some profit-taking towards the close was responsible for a slight set-back. It is evident that the bulk of the buying, especially in the Industrial market, was brought about by the announcement of the results achieved at the Ottawa Conference; but as some considerable time must elapse before anything tangible in the way of an improvement in trade can ensue from these decisions, much of the business done was of a purely speculative character.

There was a trifle more activity in the Gas Market, and though in several instances transactions were recorded at prices a shade under those of the previous week the quotations in these cases remained the same. There was a further batch of *ex* div. markings, otherwise price changes were very few. A sharp rise of 7 points to 110 occurred in European ordinary on the announcement of an increased interim dividend payment to 2½ p.ct. free of tax (against 2 p.ct. free of tax). This stock has been steadily improving for some weeks past, and is now 25 points above the lowest price at which it has stood this year. Another improvement of note was that of Cape Town 4½ p.ct. debenture, which gained 4½ points to 89½ and still yields a little over 5 p.ct. Apart from a few fractional falls, the only reduction was that of South Suburban ordinary which fell 3 points to 114½.

In view of the lower yield now established for British Government securities, it is interesting to note the effect of the altered conditions on Gas preference and debenture stocks. The following table showing twelve of the larger issues illustrates the extent of the change, which on these stocks is approximately 1¼ p.ct.:

—	Price Dec. 31.	Yield P.Ct.	Current Price.	Yield P.Ct.
		£ s. d		£ s. d.
Bristol 5 p.ct. deb.	99	5 1 0	117½	4 5 1
Commercial 3 p.ct. deb. . .	53½	5 12 1	72½	4 2 9
Gas Light 4 p.ct. pref. . . .	72½	5 10 4	97½	4 2 0
,, 3 p.ct. deb. . . .	53½	5 12 1	77½	3 17 5
Mid Southern 4 p.ct. pref. . .	69½	5 15 1	84½	4 14 8
Newcastle 4 p.ct. pref. . . .	69	5 15 11	90	4 8 10
South Metropolitan 6 p.ct. pref.	105½	5 13 9	132½	4 10 6
,, ,, 3 p.ct. deb.	55½	5 8 1	77½	3 17 5
South Suburban 5 p.ct. deb. .	94½	5 5 9	118½	4 4 4
Tottenham 4 p.ct. deb.. . .	70½	5 13 5	93½	4 5 6
Wandsworth 5 p.ct. pref. . .	92½	5 8 1	111½	4 9 8
,, 5 p.ct. deb. . .	94½	5 5 9	117½	4 5 1

Current Sales of Gas Products.

The London Market for Tar Products.

LONDON, *Aug.* 29.

The prices of tar products for the current week are as follows:

Pitch, 95s. to 97s. 6d. per ton f.o.b.

Creosote, 3½d. to 5d. per gallon f.o.b. according to specification.

Refined tar is 4d. to 4¼d. per gallon in bulk at makers' works.

Pure toluole is about 2s. 5d.; pure benzole, about 1s. 8d.; 95/160 solvent naphtha, 1s. 4½d. to 1s. 5d.; and 90/140 pyridine bases 3s. 9d. to 4s.—all per gallon naked at makers' works.

Tar and Tar Products in the Provinces.

Aug. 29.

The average prices of gas-works products during the week were: Gas-works tar, 34s. 6d. to 39s. 6d. Pitch—East Coast, 85s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 85s. f.o.b.* Toluole, naked, North, 1s. 7½d. to 1s. 9d. Coal-tar crude naphtha, in bulk, North, 5d. to 5¼d. Solvent naphtha, naked, North, 1s. 2½d. to 1s. 3d. Heavy naphtha, North, 10½d. to 11d. Creosote, *ex* works, in bulk, North, liquid and salty, 2½d. to 3d.; low gravity, 1¼d.; Scotland, 2¾d. to 3d. Heavy oils, in bulk, North, 4¾d. to 5¼d. Carbolic acid, 60's, 1s. 7d. to 1s. 7½d. Naphthalene, £9 to £10. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Aug.* 27.

Business remains rather dull, but quotations are well maintained in most departments.

Crude gas-works tar.—Actual value is 55s. to 60s. per ton *ex* works.

Pitch.—There is no change in this product, which is firm in tone. Export value is 85s. to 90s. per ton f.o.b., and home trade quotations range from 90s. to 100s. per ton *ex* works, according to quality.

Refined tar to Ministry of Transport specification remains dull with quotations steady at 4¼d. to 4½d. per gallon f.o.r. in buyers' packages.

Creosote oil.—Stocks are low and the market is steady for both prompt and forward delivery. B.E.S.A. specification is 3½d. to 3¾d. per gallon; low gravity, 3¾d. to 4d. per gallon; and neutral oil, 3¾d. to 4d. per gallon—all *ex* works in bulk.

Cresylic acid.—This remains a disappointing product with production more than sufficient to meet demand. Pale, 97/99 p.ct., 1s. to 1s. 1d. per gallon; dark, 97/99 p.ct., 11d. to 1s. per gallon; and pale, 99/100 p.ct., 1s. 2d. to 1s. 3d. per gallon—all f.o.r. in buyers' packages.

Crude naphtha.—Quotations are unchanged at 4½d. to 5d. per gallon, according to quality.

Solvent naphtha.—Demand is poor and prices are easy. 90/160 grade is 1s. 2d. to 1s. 3d. per gallon, and 90/190 grade 11d. to 1s. per gallon.

Motor benzole.—Quotations are maintained at 1s. 2½d. to 1s. 3½d. per gallon *ex* works in bulk.

Pyridines.—90/160 grade is 3s. to 3s. 3d. per gallon, and 90/140 grade, 3s. 3d. to 3s. 6d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time.

	s. d.		s. d.	
Crude benzole	0 8½	to	0 9	per gallon at works
Motor ,, ...	1 3½	,,	1 4	,, ,, ,,
Pure ,, ...	1 7	,,	1 8	,, ,, ,,

Contracts Advertised To-Day.

Coal.

The Sidmouth Gas Department invite tenders for the supply of coal. [Advert. on p. 466.]

Retorts.

The Bexhill Gas Department invite tenders for the re-setting of retorts. [Advert. on p. 466.]

Purifiers.

The Belfast Gas Department invite tenders for the dismantling of existing purifiers and the supply of cast iron luteless purifiers. [Advert. on p. 466.]

New Capital Issues.

Gosport District Gas Company.—As will be seen from our advertisement columns, Messrs. Llewellyn Puttock & Blake, of High Street, Gosport, are offering for sale by public auction on Wednesday, Sept. 14, an issue of £10,000 of 5 p.ct. debenture stock (redeemable at par in 1943) of the Gosport District Gas Company in lots of £20, £50, and £100.

Trade Notes.

Provincial Incandescent Fittings Company, Ltd.

We have received from this firm, of Pifco House, High Street, Manchester, a copy of their new Annual Catalogue, which is excellently produced and should be of much service to the Gas Industry.

British Aluminium Company, Ltd.

The British Aluminium Company, Ltd., Adelaide House, King William Street, London, E.C. 4, announce that the telephone number of their new London Warehouse at 23-25, Pancras Road, N.W. 1, is North 5301 (two lines).

British Thomson-Houston Company, Ltd.

The firm have just received an order from Associated Electrical Industries (India), Ltd., for a large synchronous motor to drive a continuous sheet bar and billet rolling mill at the Jamshedpur Works, India, of the Tata Iron & Steel Company. The motor, which is of the totally enclosed type with closed-circuit air cooling, will be rated at 7500 h.p. The motor will be the largest machine of its kind ever built in Great Britain, the diameter being 26 ft., with a shaft no less than 2 ft. in diameter.